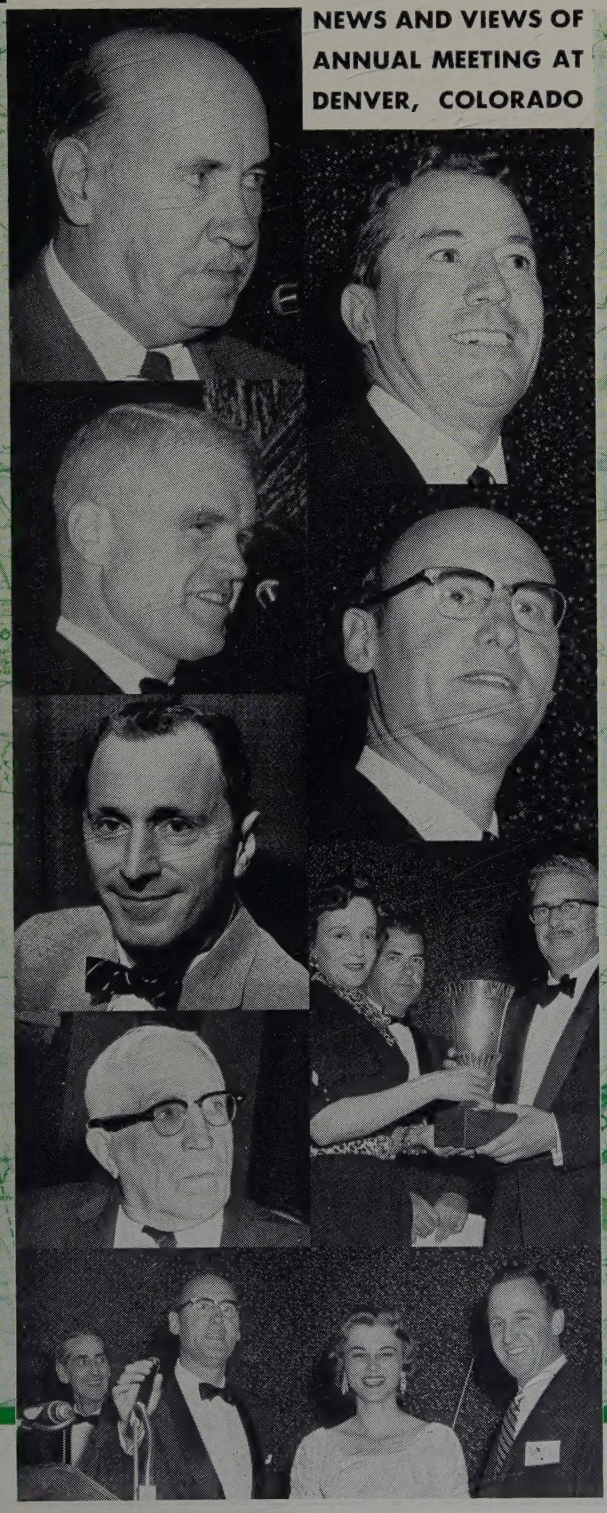
NOVEMBER 1957

Skyways FOR BUSINESS

OFFICIAL PUBLICATION OF NATIONAL BUSINESS AIRCRAFT ASSOCIATION

NEWS AND VIEWS OF ANNUAL MEETING AT DENVER, COLORADO



Igor I. Sikorsky "Mr. Helicopter" Founder of Sikorsky Aircraft

James T. Pyle Administrator Civil Aeronautics Administration

W. Buril Barclay CAA safety specialist, Business Flying, Air Taxi, Lighter than Air, Jet Operations

William T. Piper, who introduced business to flying since 1928

Elwood R. Quesada, Special Assistant, President Eisenhower; Chairman, Airways Modernization Board

Joseph B. Burns President, NBAA

Mrs. Fred Wallace, WAA Kansas; Ralph Piper, NBAA; C. E. A. Brown, right, receives Flight Safety Trophy (See Story)

Henry Boggess, past NBAA pres. J. B. Burns, NBAA pres.; Mona George, Miss NBAA; A. L. Ueltschi, pres., Flight Safety, Inc.

POST CONVENTION ISSUE

reports on PERSONALITIES and EVENTS—tenth annual NBAA forum

NOVEMBER, 1957

Skyways FOR BUSINESS

The official publication of the National Business Aircraft Association

FOUNDED BY J. FRED HENRY, 1942
EDITOR & PUBLISHER
LOIS HENRY

EDITORIAL
Lindy Boyes Joseph Bush
George Watts

CONTRIBUTING EDITORS
Capt. Chuck Banfe, West Coast
Karl Hess, Fuels & Oils—Dick Groux, Wash., DC
Herbert O. Fisher, Flight Evaluations

SALES & PUBLIC RELATIONS
I. R. Ackerman

BUSINESS & PRODUCTION MANAGER
Stanley M. Cook

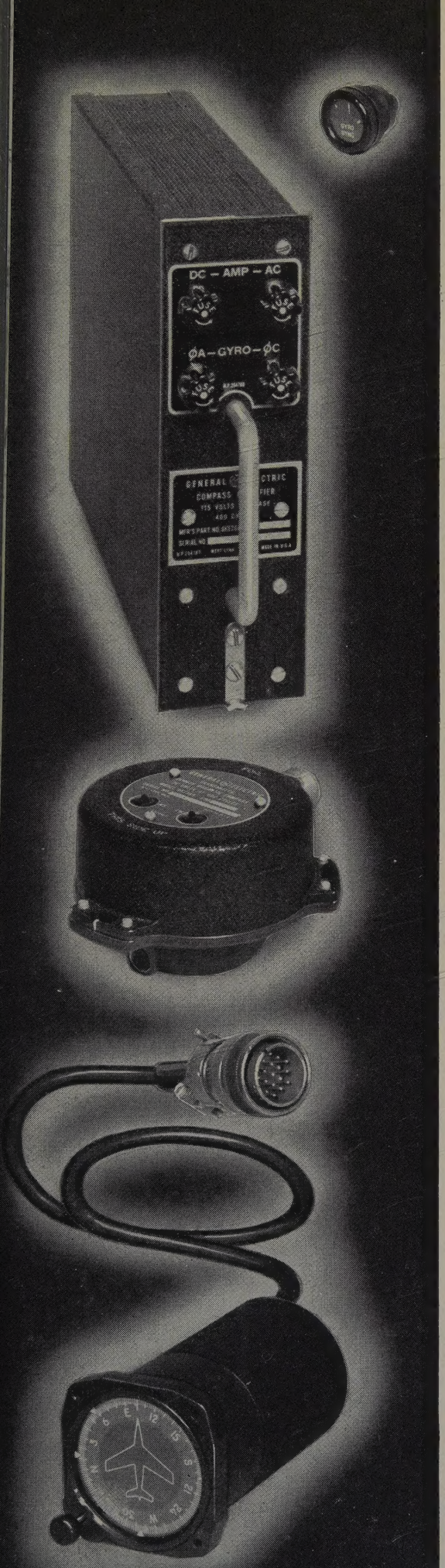
READER SERVICE CIRCULATION
Philip E. Woldenberg

ADVERTISING OFFICE, 425 Fourth Ave., N. Y. 16, N. Y. Tel MU 9-2684
MIDWEST—161 E. Grand Ave., Chicago 11, Ill., Tel. WHitehall 4-2260
WEST COAST—Boyd B. Garrigan, 5478 Wilshire Blvd., Los Angeles 36, Cal. Tel. WE 8-4411

BPA
Member Business Publications Audit of Circulation, Inc.

VOLUME 16, NUMBER 11

SKYWAYS is published monthly by Henry Publishing Co., Emmett Street, Bristol, Conn.; Editorial and Executive Offices: 425 Fourth Ave., New York 16, N. Y. Printed in the U. S. A. Single copy; 50c. Subscription Prices. U. S. Possessions, Canada and Pan Am. Union $9.00 for 3 years, $7.00 for 2 years, $4.00 for 1 year; all other countries add $1.50 per year for postage. Please give title, position and company connection when subscribing. Six weeks required for address changes (give both old and new). Manuscripts, drawings, other material must be accompanied by stamped, self-addressed envelope. SKYWAYS is not responsible for unsolicited materials. Accepted as controlled circulation publication at Bristol, Conn.



NEW compass system for business aircraft weighs only . . .

8 LBS

. . . about half the weight of comparable compass systems

NOW . . . General Electric offers you the first lightweight, low price business aircraft compass system with an electrically driven, panel-mounted gyroscope—similar in quality to the gyroscopes developed by General Electric for military use.

General Electric's business aircraft compass system weighs only 8 pounds. Yet you can buy this lightweight, highly accurate system for approximately half the price of other electrically driven compass systems now on the market.

Like its military counterpart—the standard Navy G-2 Compass System—the business compass system is a highly accurate heading reference system. Maximum error in heading accuracy never exceeds 2 degrees, and you are assured operational stability at altitudes up to 40,000 feet.

General Electric's business compass system can be installed —with speed and ease—on any business aircraft that has an a-c power supply. If a-c power is not available on your aircraft, an easily installed inverter can supply the proper power. The business compass system operates on only 24 watts of 115 volt—400 cycle, three-phase power.

General Electric's modern compass system will be displayed at your National Business Aircraft Association Forum in Denver, October 2, 3, and 4. Look for Booths 307 and 308.

You can get 30-day delivery on General Electric's business aircraft compass system by contacting your nearby sales outlet for the Wilcox Electric Company, Inc., distributor for the General Electric system. If you would like more information on this modern system before you place your order, write today to Section 586–14, General Electric Company, Schenectady 5, N. Y. Ask for Bulletin GEA-6712.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Editorial

ONE BIRDMAN'S EYE VIEW

Almost all employers are now-a-days faced with acute problems arising from employee *turnover,* from recruitment of acceptable replacements and from the continuing task of training new people to handle the myriad specialized phases of modern business.

Essentially, these personnel problems stem from a shortage of qualified people to fill the ever growing number of scientific, technical and specialized jobs our expanding economy is creating.

The age old and irrevocable law of supply and demand is at work in the market places of human service. In numerous classifications of human endeavor there are needs for greater numbers of trained people than there are qualified people.

Our newspapers and magazines have been doing a thriving business in recent years running ads for specialized help. Quite often the results have been about the same as robbing Peter to pay Paul: employers have been unwittingly poaching on one another's ground. It is questionable that these ads have materially increased the number of competent people to meet demands.

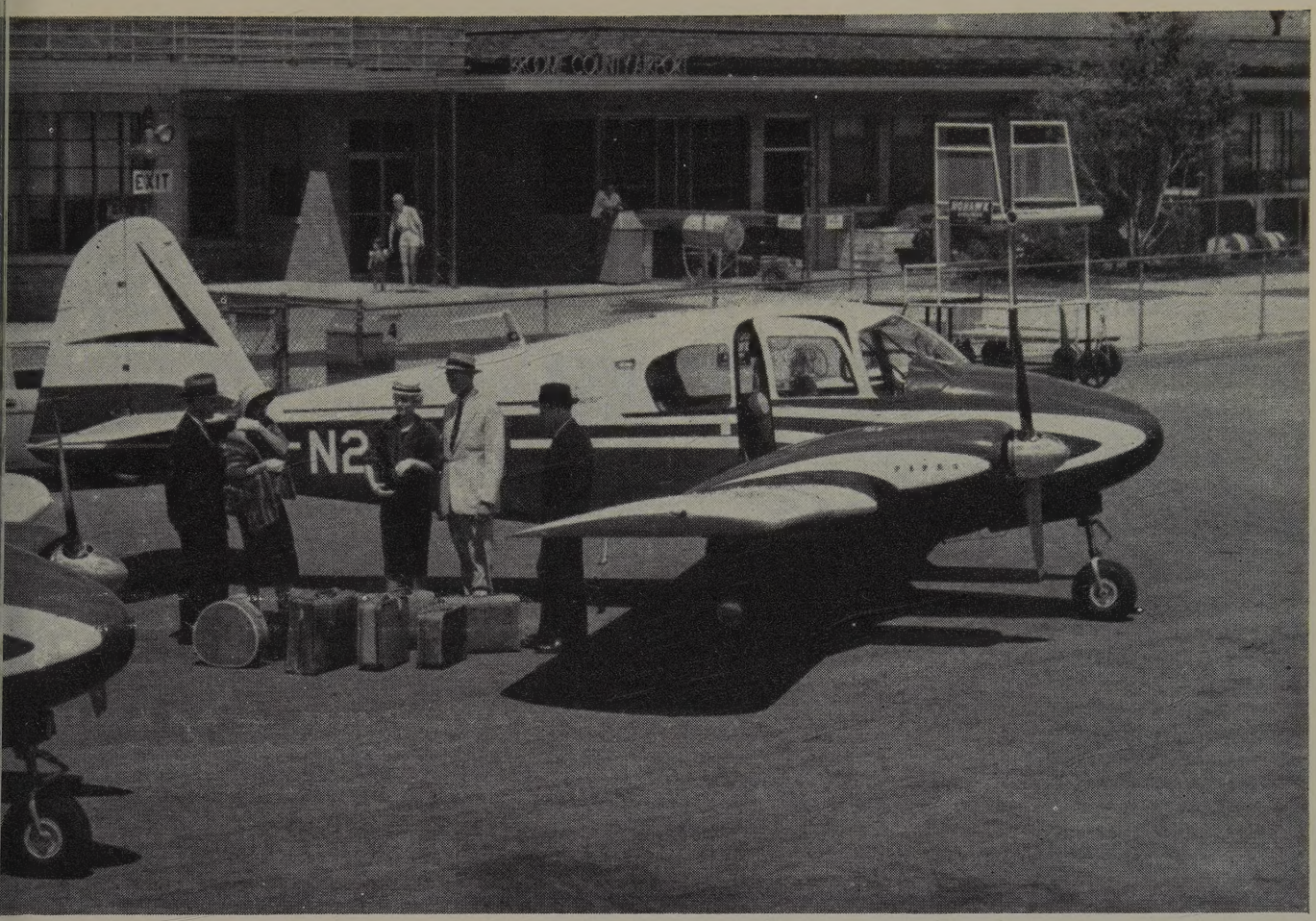
Everyone knows that embryonic scientists graduating from colleges in the past few years have really been in clover. Even science graduates in the lower third of their classes have faced the problem of deciding which of several attractive job offers to accept. However, it should be universally recognized that *shortages of trained people are not confined to engineers, chemists, physicists, and to other pure scientific fields.*

The one fly in the ointment is that there does not seem to be understanding by the public that acute shortages also exist in specialized fields not included in the so-called "pure sciences." Among these are aircraft and engine mechanics, radio and electronic technicians and, what is of great importance, pilots.

The building, the proper servicing and the skilled operation of aircraft rank among the world's most exacting tasks. Men to build, to maintain and to pilot these miracles of genius do not just grow on trees. Too few of our technical schools have adequate courses to properly train such people. Too few of our people foresee the expanding need for such courses. The avenues to gain required experience after training are too limited. Too few of our youth really understand the job opportunities that lie in tomorrow's field of aviation.

Perhaps if those of us who are really close to aviation, who understand its needs, who envision its growing potential, were to take up the 'hobby' of interesting youth in aviation, we would render a lasting service to these young people, to our industry and our Nation. There isn't a man or a woman in the field of aviation who could not help in interesting the youth of America in preparing for a career in aviation. Here is a task that must be done in the neighborhoods, a job of individual contacts, of community relationships.

At every opportunity why not adopt the policy of interesting a youngster in a career of aviation? Make it a hobby! It will be interesting, satisfying and could prove to be the most patriotic thing you ever did!



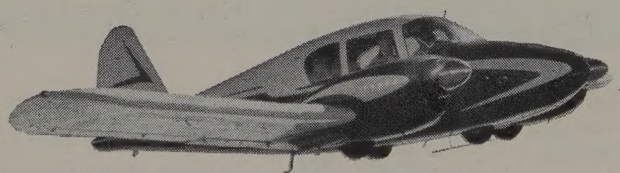
PIPER *Apache*

...with more power, more speed, more payload

Now the world's most popular executive twin is powered with new, more efficient, high-compression Lycoming 160 hp engines for better fuel economy yet higher cruising speed, better all around performance and nearly 300 pounds of added payload!

The beautiful new 1958 Apache cruises over 170 mph with a whopping 1,570-pound payload, enough weight allowance for five passengers and 108 gallons of fuel (72 gallons in main tanks, 36 in optional auxiliaries) for a range of more than 1,200 miles.

The most thoroughly proven light twin on the market, and by far the most popular, the new 1958 Apache with its increased payload and performance represents more than ever the best possible investment for round-the-clock, night and day transportation with twin-engine reliability. $35,990 standard, completely equipped less radio. See your Piper dealer or write for new brochure, Dept. K-11.



PIPER
AIRCRAFT CORPORATION
LOCK HAVEN, PA.

MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

Aviation Roundup

CESSNA 620 PROGRAM DROPPED, Dwane L. Wallace, Cessna president, announces. "The 4-engine Model 620 project is being de-activated . . . decision resulted from re-examination of market potential and financial investment involved." Other words, too many rising costs.

★ ★ ★

NORTHERN NATURAL GAS CO. Omaha, Neb., is building a hangar, 160 by 160 feet with a 160-foot lean-to for shops and offices.

★ ★ ★

FRED J. EARLY CO., San Francisco, Calif., taking bids on hangar to be built at S.F. International Airport.

★ ★ ★

"SEE-AND-BE-SEEN" by Switzer Blaze Orange Paint. Auto fluorescence claimed to last on un-hangared plane four months. Company is at Cleveland, O.

★ ★ ★

THERE WILL ALWAYS BE A HUMAN PILOT, says Capt. A. S. Hill, Moffett Field NAS, Calif. "There is no kind of electronic brain that will replace thinking and courage of man." "The pilotless aircraft is impossible as a complete air arm," he told business men.

★ ★ ★

IDAHO HAS 60 AIRPORTS at altitudes above 5,000 feet . . . 15 are above 6,000 feet, two above 7,000 and one above 8,000 MSL. Pilots planning to fly into Idaho area for big game hunting or business trips are reminded not to forget the loss of power and lift at altitude.

★ ★ ★

FLYING IN THE SEATTLE AREA requires two-way radio at Boeing Field (Unless prior permission is obtained from the tower operator).

★ ★ ★

MONTANA AERONAUTICS COMMISSION and airport operators are sponsoring program to install Unicom radio equipment at 17 Montana community airports. The air-to-ground communications to be at airports where a standby watch will be maintained in daylight hours to serve planes. Will provide information on field conditions, weather, transportation and airplane service.

★ ★ ★

TO APPEAR IN AIRMAN'S GUIDE, "On Top IFR Operations. Effective now, 'at least 1,000 on top' is changed to 'VFR conditions on top.' " CAA says "pilots proposing IFR operations on top in lieu of specific altitude should specify 'VFR conditions on top' in filing IFR Flight Plan." Must continue to fly 1,000 on top to apply for "VFR conditions on top."

★ ★ ★

TEMCO IS NOW TESTING its jet production model, TT-1 Pinto, a sleek primary trainer capable of 500-knot cruise and 62-knot landing speed.

★ ★ ★

DEHAVILLAND'S TWIN-ENGINE CARIBOU, DHC-4, has changed tail configuration from double to single unit. DeHavilland Aircraft of Canada Ltd. starts production in 1959 to supply ten to U.S. Army. Civil orders can be delivered in 1960 with P&W R2000s or a turboprop engine.

WHO'S NEW: Richard H. Perley, appointed vice president and general manager, Hycon Aerial Survey, Inc., Pasadena, Calif. . . . Alan C. Morgan elected vice president of contracts, Northrop Aircraft, Inc., Hawthorne, Calif. . . . Dr. Wm. F. Ballhaus named vice president, engineering, Northrop. . . . Richard S. Martin appointed sales manager, Mooney Aircraft Inc., Kerrville, Tex.

B. B. Bundesman named commercial sales manager for Lockheed's Jetstar, Marietta, Georgia . . . Andre Reichel, new director of sales service, Aeronautical Division, Pacific Scientific Co., Los Angeles, Calif. . . . Frank Reggio, appointed industrial sales manager, Permatex Co., Huntington Station, N.Y.

★ ★ ★

AERODEX, MIAMI, Fla., year of progress includes separation of military and commercial overhaul buildings and their supporting departments . . . stores, planning, stock records, material control and production. An addition of 44,000 sq. ft. of production area was completed.

★ ★ ★

TECO, INC., BURBANK, Calif., celebrates eighth year specialized manufacturing passenger seats for business, airline, military aviation.

★ ★ ★

UTILITY AIRCRAFT MARKET sales efforts challenged by Joseph T. Geuting Jr. with figures, 1956 only 27% of light planes sold by one manufacturer were to new owners; 73% were replacements to companies or individuals. Geuting is manager of Aircraft Industries Assn.'s Utility Airplanes Council.

★ ★ ★

TIMMINS AVIATION LTD., MONTREAL, Quebec, named distributor for Quebec and Maritime Provinces of Canada for Beech Aircraft Corp. John A. Timmins is president; Jack Graham, general manager. Field Aviation Ltd., Oshawa Municipal Airport, Ontario, continues to direct Beech sales in central and western Canadian provinces.

★ ★ ★

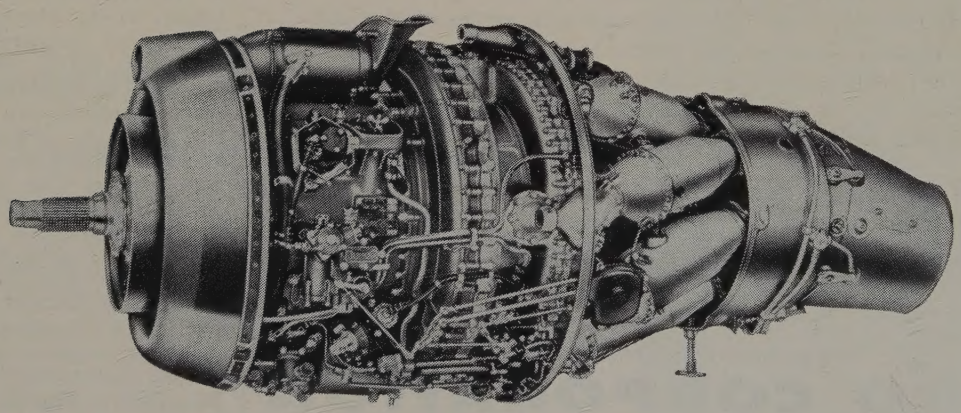
DATELINES . . . Nov. 10, Eighth Sportsmen Pilots Handicap Air Race from McCarren Field, Las Vegas, Nev., to San Jose, Municipal Airport, Calif. . . . 37th annual meeting American Petroleum Institute, Chicago, Ill., Nov. 11 to 14 . . . Nov. 16, Long Beach Municipal Airport, Calif., 19th annual Wings Over the Nation Air Show sponsored by Long Beach Jr. Chamber of Commerce . . . Nov. 18 to 21, Air Conditioning and Refrigeration Exposition, Chicago, Ill. . . . Nov. 21-22, Aviation Distributors and Manufacturers Assn. annual meeting, Detroit, Mich. . . . Dec. 2 to 5, aviation program of the American Society of Mechanical Engineers annual meeting, New York, N.Y. . . . Dec. 7, Winslow Municipal Airport, Ariz., all Indian Christmas Party, 11 a.m., with wagon parade.

★ ★ ★

HIGH ALTITUDE CONTROL PLAN has been postponed by CAA to December 1 when all airspace above 24,000 feet will be controlled. The action to delay the first phase of CAA's control plan is request of the U.S. Air Force and Navy which are primary users of these altitudes. Reason for delay, not enough time between the CAB's October 2 regulations authorizing implementation of the plan and the effective date of November 1 to supply adequate pilot briefing and distribution of new maps and charts.

ROLLS-ROYCE
DART
PROP-JETS

POWER THE VICKERS VISCOUNT, THE FAIRCHILD F-27 AND THE AVIATION TRADERS ACCOUNTANT AND HAVE BEEN CHOSEN FOR THE ARMSTRONG WHITWORTH 650 THE HANDLEY PAGE HERALD AND THE GRUMMAN GULFSTREAM



For airline, local service carrier and executive operation, the Rolls-Royce Dart is the most proven prop-jet in the world. It has flown over 3,000,000 hours in scheduled airline service.

ROLLS-ROYCE LIMITED · ENGLAND · SCOTLAND · CANADA · AUSTRALIA

EDUCATIONAL PROGRAM FOR BUSINESS PILOTS ON SAFETY

University of Southern California, Los Angeles

Aviation Institute for Commercial Carriers and Business Pilots

Two-Week Session—January 20-February 7, 1958

I — Aeronautical Engineering
II — Aviation Physiology
III — Aviation Psychology
IV — Aircraft Accident Prevention

(Presented by Aviation Safety Director University of Southern California)

NOTE: — Advance registration should be made prior to December 20, 1957.

Suite 344

Now that NBAA's Tenth Annual Meeting has passed—do you have any problems that weren't solved? If so, we at your National Headquarters, look forward to helping you with them. All it takes is a 'phone call or letter.

Your Board of Directors held their September Board of Director's meeting at the Cosmopolitan Hotel, Denver, Colorado. Those present, Joseph B. Burns, President, representing the Fuller Brush Company; Gerard J. Eger, NBAA Treasurer, representing International Harvester Company; B. J. Bergesen, representing the Ford Motor Company; Henry W. Boggess, representing Sinclair Refining Company; Ralph E. Piper, representing Monsanto Chemical Company; also present, John Winant, representing Sprague Electric Company and E. M. Beattie, representing General Electric Company.

On behalf of the membership and the Board of Directors NBAA welcomes the following new members. NATIONAL DISTILLERS AND CHEMICAL CORPORATION, New York, N. Y., Alcoholic beverage and chemical production, operating Lockheed PV-1; Arthur A. Ramer, Production Manager is NBAA and Harold Curtis is Chief Pilot. W. A. SHEAFFER PEN COMPANY, Keokuk, Ia., Pen and Pencil Manufacturers, operating Cessna 310; Donald E. Berrier, Chief Pilot, is NBAA's representative and J. B. Finley, Traffic Manager, is in charge of aviation activities. PANHANDLE EASTERN PIPE LINE COMPANY, Kansas City, Mo., Natural Gas Pipe Line, operating two Twin Beech E-18-S's; J. R. Myers, Asst. General Manager, Gathering & Transmission Div., is Chief Pilot and NBAA Representative. CLARK BROS. CO., Olean, N. Y., Manufacturer of Engines, Compressors and turbines, operating Aero Commander 680; Richard G. Muller, Chief Pilot, is NBAA Representative and F. W. Laverty, Executive Vice President, is in charge of aviation activities. DeNARDO & McFARLAND WEATHER SERVICES, Dravosburg, Pa., Private weather service (flight advisory weather service), Joseph W. DeNardo, Business Manager, is NBAA Representative. NATIONAL INSURANCE UNDERWRITERS, St. Louis, Mo., insurance on autos and aircraft, operating Riley; D. W. Kratz, President, is NBAA Representative and Chief Pilot. TRECKER AIRCRAFT CORPORATION, Milwaukee, Wis., Aircraft Manufacturing, Carl B. Wootten, Executive Vice President, is NBAA Representative, and Al Balaban, Manager, Advertising and Sales Promotion, is in charge of aviation activities.

Cole H. Morrow, J. I. Case Company, was awarded NBAA's Honorary Membership in the Association for his outstanding leadership as President (1951-1954) and exemplary service as Board

(Continued on page 61)

NBAA . . . Director's Notes

Aircraft proximity warning systems and collision avoidance systems (PWI/CAS) are still top-priority for aviation safety. Four NBAA member companies are hard at work to solve this almost overwhelming task.

Bendix Radio has a U. S. Air Force study contract; Aerojet-General is working on an infra-red detection device; RCA is working on the possibilities of using weather radar as a source of proximity warning when used with associated integrating electronics and Sylvania Electric with a cooperative (where each airplane needs the equipment) ultra-violet proximity warning system.

The rewards to the successful inventor will be tremendous. The safety awards to the hundreds of thousands of airborne pilots and passengers will never be computed.

* * *

Let's kill a rumor right now. Almost wrote "scotch a rumor," but that wouldn't fit the story.

It has been said that during the recent U. S. tour of the Caravelle—France's entry into the jet transport market—that more champagne was consumed than jet fuel.

It ain't so. For the record, official count showed that less than 400 cases of champagne were consumed.

Evansville, Indiana, plays host to numbers of transient business aircraft every month. Now their terminal building offers a luxurious lounge available to business aircraft pilots and their passengers. New lounge, complete with Terror-Vision, is a Hertz Rent-A-Car project . . . and maybe will be extended to other airports.

TIRED OF LIVING DEPARTMENT (MANAGEMENT SECTION)

Reliable sources pass on the case of a New England business man who became convinced of the advantages of owning an airplane for use in his business. Too busy to learn to fly the single-engined aircraft himself, he hired a pilot. The pilot flies between two densely air-trafficked cities . . . through probably the most complicated control areas in the U. S. He lands at busy commercial airports enroute. He flies in an area noted for sudden storms and rapidly changing weather conditions.

What does this pilot do with his salary? He spends it getting additional training for . . . a commercial pilot's certificate.

* * *

Another possible entry into the business aircraft field in the turbo-prop or full jet configuration is Republic Aviation. Company engineers have been tossing the pro's and con's about.

NBAA Membership

Information regarding regular or Associate Membership in the National Business Aircraft Association is readily secured by writing to the Executive Director and Secretary of NBAA at 344 Pennsylvania Bldg., Washington 4, D.C.

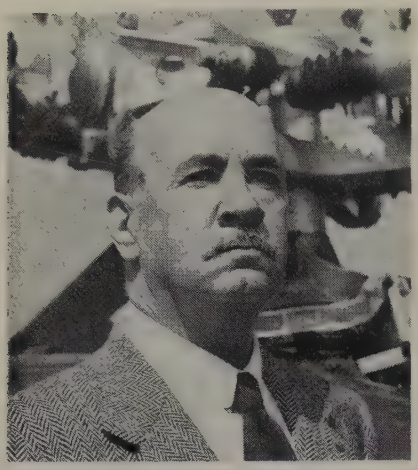
Membership in this non-profit and independent aviation organization is based on the recognition of business flying problems common to all users of aircraft for business purposes and to those engaged in supporting the operation, servicing, equipment, and manufacture of business aircraft.

Among the fields in which NBAA is concerned are: improvements in airways and airports, better weather service, expansion in communications and air navigation facilities, higher standards of airport services, improved aircraft parts distribution, equitable tax rulings for business aircraft operations, greater recognition of the airplane as a necessary tool in modern business and industry, better air traffic control procedures, professional status for qualified business pilots, and aircraft designed to meet the special requirements of business flying.

(See application, Page 42-43.)

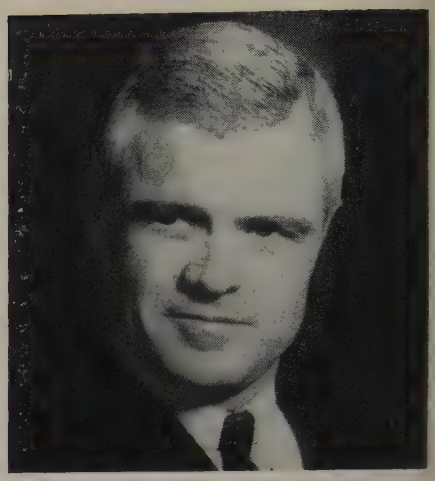
Aviation Leaders Speak Out At Denver

IGOR I. SIKORSKY



ELWOOD R. QUESADA

JAMES T. PYLE



NBAA Meritorious Award To Igor I. Sikorsky

Igor I. Sikorsky, recipient of the National Business Aircraft Association's annual Meritorious Award for outstanding contributions to the advancement of business flying, said that "nothing can compare to the free work of free men" on accepting the award.

In presenting the bronze plaque to Sikorsky, whose aviation career parallels the history of powered flight, Joseph B. Burns, NBAA president, cited the Russian born inventor's pioneer work in three fields of aviation . . . multi-engine aircraft, trans-oceanic flying boats and helicopters . . . all of which have added to the mobility of American business domestically and internationally.

The engraved citation reads, "To Igor I. Sikorsky whose half-century of vision, resourcefulness and determination in pioneering and developing fixed and rotary wing aircraft has given new dimensions to the world community of commerce."

Previous recipients are Charles A. Lindbergh and Edward V. Rickenbacker.

The presentation was part of NBAA's three-day annual convention held at Denver, Colo., October 2, 3 and 4.

Old Techniques for a New Aviation Facilities System, says Quesada

A program to obtain a significant increase in the capacity and performance of the national system of aviation facilities is imperative and as soon as possible, Elwood R. Quesada, special assistant to the President, and chairman of the Airways Modernization Board (AMB), told NBAA members.

Full effort of the AMB will be directed to a modernizing program between Jan. 1, 1958, and Jan. 1, 1963, taking advantage of the tremendous "back log of techniques" available.

The AMB plans aviation facilities improvements on a system wide basis, not limited to electronic equipment, he said. In the next two years some $200,000,000 will be spent for high speed turnoffs, lighting, new runways, by-pass strips, etc., Quesada added.

He said that the AMB will learn what is needed for general aviation at terminals where high-and low-performance aircraft mix . . . in all kinds of weather. Quesada is confident that "a unified airport configuration research program, supported by civil, military, Government and non-Government airport interests, will result in valuable data to guide this much needed expansion."

Pyle Stresses Safety To Fliers At NBAA Meeting At Denver

Business flying, or perhaps more properly executive transportation, is the largest and most important segment of general aviation, James T. Pyle, CAA Administrator, told members of the National Business Aircraft Association at Denver, Colo. Approximately one-half of the pilots who hold airline transport certificates are engaged in general aviation flying most of them in the business or corporate field. Another indication of increased activity in business flying is found in the increased use of larger and more complex aircraft. Multi-engine airplanes in general aviation increased twenty-five percent from January 1956 to January 1957. Many of these are heavy twin-engine and even four-engine aircraft, comparable to those used in scheduled airlines and representing investments of millions of dollars.

Besides the modern conventional transports, business flying is making tremendously effective use of the versatile qualities found in helicopters. It is reported that during July one company alone carried more than 14,000 passengers in their company-owned helicopters. This represents 40% more than the number of passengers carried during the same period by a scheduled helicopter service operating in a major metropolitan area. These developments, changes and new equipment are bringing new problems into the field of safety.

The trend toward the use of larger, more complex aircraft has resulted in a tremendous increase in night and IFR operations. This in turn has produced two major safety problems in executive air transportation—the upgrading of crews to be fully capable of handling the modern executive transport and of acquiring personal knowledge of its capabilities and limitations; and, the maintenance of continuing instrument proficiency. Actually, these are both part of the same problem—that of the pilot's professional day-in and day-out competency. In both of these

Aircraft Display at Mile High Building

TRECKER GULL *makes a spot landing in Mile High Bldg. pond with aid of crane.*

VARIETY OF PLANES *attracted public attention with 90 hp. to twin jet models.*

areas, the safety picture is spotty.

Pyle pointed out the tremendous increase in IFR traffic . . . 48 percent more in 1957 than in 1956. This is divided among the different phases of aviation into 69 percent more IFR flying this year than last for general aviation; 52 percent more military; and 42 percent more commercial IFR flying.

Safety measures taken by the CAA when the "loss of control" type accident rate for modern light twins reached alarming proportions were described by Pyle. First, a training program was set up in light twins for CAA inspectors, so that they would be familiar with the characteristics of the planes.

Second, operators of light twins were urged to set up pilot training programs.

Third, manufacturers and distributors joined with the CAA in furnishing owners and operators with more accurate performance information. "The results of this program have been most encouraging," Pyle said, "and the light twin 'loss of control' type accident rate has showed steady improvement."

Other areas in which business operations are not regulated concern flight time limitations and maintenance of instrument proficiency. There are no fixed requirements to prevent pilot fatigue, although this is not the problem it was a year or two ago, Pyle said.

Continued instrument proficiency needs immediate and combined CAA-business fliers' attention. Pyle urges a *joint effort* because "past experience has shown that government and industry working together can be an unbeatable team. We must—again by joint effort—come up with sound programs of pilot training, clear-cut and effective flight test procedures, and top it off with a realistic program of periodic evaluation of pilot proficiency.

"An enemy of safety," Pyle added, "is the use of 'Bogus Parts' in the repair, overhaul and maintenance of aircraft. The Civil Aeronautics Board has adopted Civil Air Regulations providing for engineering approval, source inspection and identification of parts fabricated by persons who do not have design rights to the basic product. The Civil Aeronautics Administration has established applicable standards and procedures to implement the regulations. However," Pyle emphasized, "the best weapon to combat the use of the unapproved part is for the aircraft owner to assure himself that his personnel maintain accurate surveillance of each and every part; that misleading advertising in trade journals, which merely imply CAA certification, be closely watched.

"With respect to design trends and forecasts, the CAA has only recently received applications for type approval of additional turbine-powered utility aircraft," Pyle said. "Such manufacturers as Lockheed, North American, McDonnell, Grumman, Beech, and Fairchild are developing aircraft designs which will have considerable effect on business flying. Also, a number of European designers are interested in the approval and use of their products in the United States."

Another difficulty cropping up among aircraft modifiers is the amount of time required in obtaining CAA approval of major modifications. The CAA is working toward expediting and clarifying procedures for such approvals without compromising safety standards.

To assist in the certification of modifications the CAA has evolved a system by which certain highly qualified engineers and test pilots in industry can evaluate modifications for CAA certification purposes. They are called Designated Engineering Representatives.

Pyle spoke October 2 to the NBAA which was holding its 10th annual convention.

Exhibits at Mile High Center Impress Denver Citizens, NBAA Members

They came in by night to the city's Mile High Center. Airplanes were towed in a silent parade through the streets of Denver in the middle of the night to be put on display for the convention guests and the citizens of the mile-high city.

Inside, exhibits of convention participants told their companies' stories in handsome layouts. Company representatives were on hand with ready answers to the myriad questions asked.

Outside, the variety of planes, in the photographs at the bottom of the opposite page, drew fliers and non-fliers alike. Identified, the planes are from front to back, Cessna 310, the twin-jet Anser mock-up at left, fuselage of the Beechcraft Super 18, twin-Bonanza, Piper's Comanche, at left is a Piper Tri-Pacer, last in line is a tail view of the Apache, at left, barely discernible among the pillars, is the Aircoupe.

The indoor exhibits included displays with moving parts . . . such as Aeroquip's "octopus" . . . motion pictures . . . such as Aerojet's pint size JATO boosting a Navion off the ground . . . company representatives with cameras . . . such as Airwork's Robert Scott with his 60-second Polaroid.

The over-all exhibit area was impressive and showed the results of a great deal of hard work.

C. E. A. Brown Receives W.A.A. Business Flight Safety Award

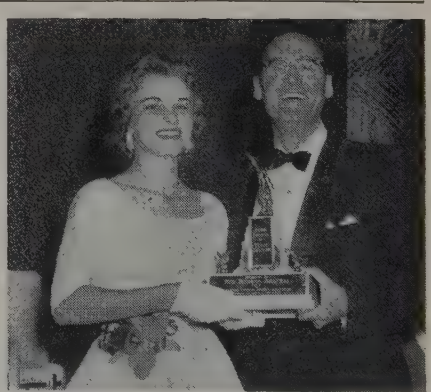
C. E. A. Brown, director of aviation, State of Ohio, received the 1957 annual Business Flight Safety Award of the Women's Aeronautical Association of Kansas. The presentation was made during the National Business Aircraft Association's convention at Denver, Colo.

The award is made annually to a person who has consistently and effectively contributed to the advancement of business flying safety.

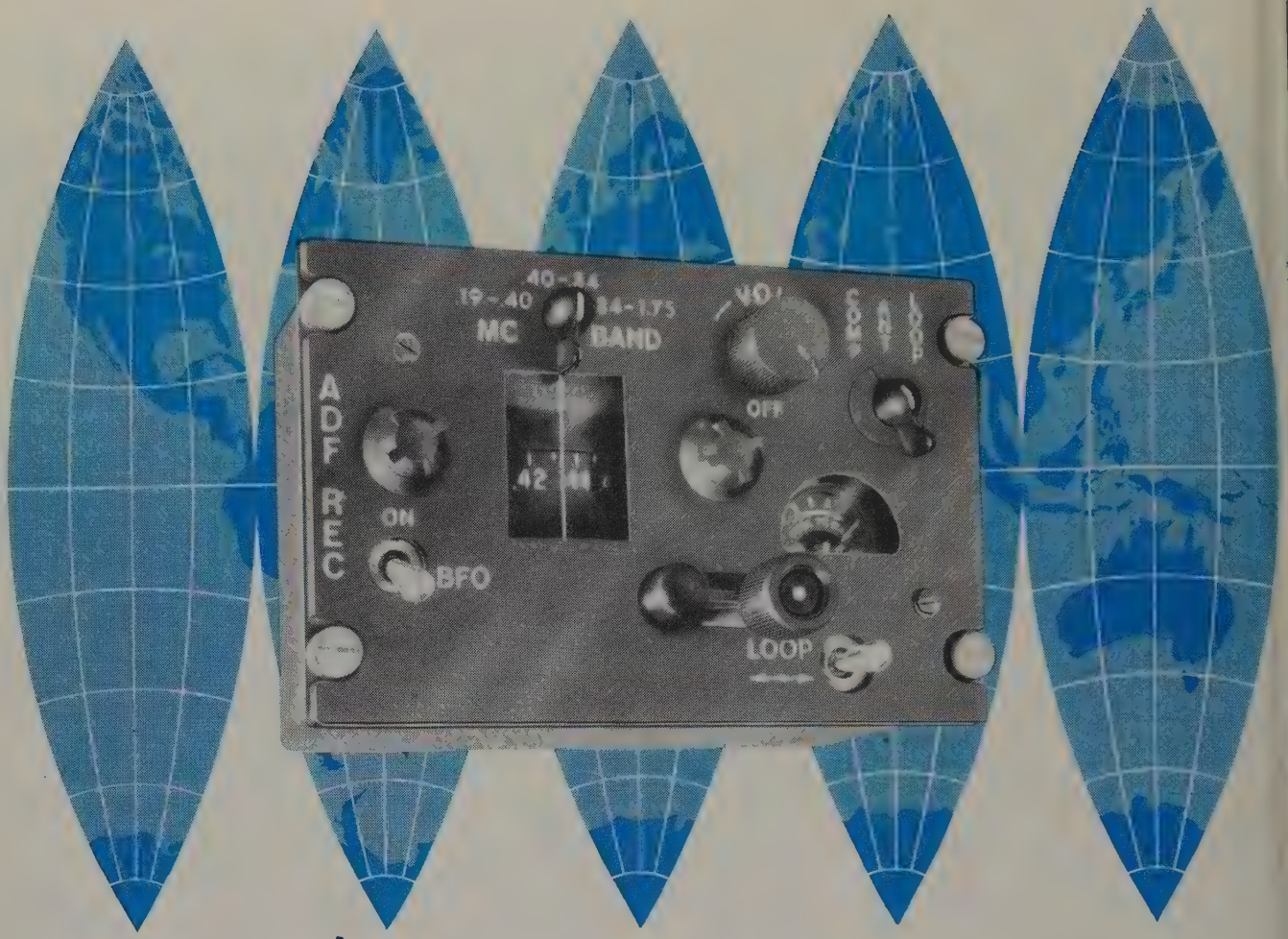
Brown is promoter and developer of the Flying Green Cross Safety program which advocates the responsibility of the individual in accident prevention. He has planned and supervised flight training techniques, conducted a series of flight clinics, sponsored the production of flight safety posters, and acted as coordinator in flight safety programs covering student training, aerial application and private and business flying in Ohio. The program is endorsed by the Civil Air Patrol, volunteer civilian auxiliary of the U.S. Air Force.

President of the WAA of Kansas is Mrs. Fred (Billie) Wallace. Hazel Jacks is chairman of the Business Flight Safety Award Committee. Committee members are Ann Morton, Irene Harmon, Marguerite Lee, Lillian Whipple and Della Allen.

COLE H. MORROW *becomes NBAA Honorary Member for outstanding contributions to the organization. Award was presented by Joe Burns, pres. (See Suite 344, Page 12, for details of award.)*



HANDSOME TROPHY *for lovely girl, Mona George, Miss NBAA, presented by Joe Burns. Presentation was made at "First Niter" banquet. Miss George also received a portable television set as a gift.*



TYPE 21A ADF WEIGHS ONLY 19.7 POUNDS

Component Unit Weights:

Receiver, 6.8 lbs.; Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.; Indicator, 1.3 lbs.; Control Unit, 1.6 lbs.; Power Unit, 5.2 lbs.;
CAA Certificate No. 1R4-9 U.S. Military: AN/ARN-59
British Certificate of Approval VC-78

World-Wide navigation aid

The Time Tested ADF Now in Less Weight, Less Space

The ADF is a basic air navigation instrument, used in all parts of the world, turnable to some 60,000 transmitters. But the important thing now about the ADF is that ARC has engineered an ADF system down to less than 20 pounds in weight, with a comparable saving in space.

Now pilots enjoy the advantages of dual installations of this compact miniaturized equipment in tolerable weight and space requirements.

The ARC Type 21A ADF is built to today's more critical speed and environmental demands. It has hermetic sealing of vital components, such as the entire loop assembly. It covers all frequencies from 190 kc to 1750 kc . . . operates on only 2.8 amps at 27.5 volts dc input or equal power at 13.5 volts. A significant feature is the extremely low loop drag—only two inches outside the aircraft skin.

Ask your dealer for detailed literature.

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation BOONTON, NEW JERSEY

Omni/Loc Receivers • Course Directors
LF Receivers and Loop Direction Finders • UHF and VHF Receivers and Transmitters (5 to 360 channels)
10-Channel Isolation Amplifiers • High Powered Cabin Audio Amplifiers • Interphone Amplifiers • Omnirange Signal Generators and Standard Course Checkers • 900-2100 Mc Signal Generators

ARC

Turbo-Prop Business Aircraft Discussed at Denver

Presentations of actual projected performance figures for turbo-prop business aircraft were made by airframe and engine manufacturers at the National Business Aircraft Assn. convention held at Denver, Colo.

Representing airframe manufacturers were David Sykes, Vickers Armstrong, Ltd.; "Skeets" Coleman, Fairchild Engine and Airplane Corp.; Bernie Harriman, Grumman Aircraft Engineering Corp.; Robert O. Denny, On Mark Engineering Co.; Lloyd W. Harris, Lockheed Aircraft Corp.; and John Calhoun, Beech Aircraft Corp.

Representing engine manufacturers were James D. Beaumont, Allison Division, GMC; Dr. Fritz Haber, Lycoming Division, AVCO Manufacturing Co.; Ken Greenly, D. Napier & Son, Ltd.; Bernard Lang, Rolls-Royce of Canada, Ltd.

J. S. (Torch) Lewis, Thatcher Glass Manufacturing Co., was moderator.

Turbo-props for the business market is hot competition now. Robert Denny of On Mark holds the view that the market is relatively small, and, therefore, it is unfeasible to design and build from scratch a turbo-prop airplane. On Mark has designed the Marksman 450 from the 10-G A-26 frame, a "dependable workhorse" with safety the main aim. It will have Allison engines.

The Vickers' Viscount, already in general use by both airlines and corporations, is "fully Americanized" to facilitate operations, David Sykes said. In comparing the percentage of delayed take-offs for mechanical reasons, Sykes included the DC-4, Constellation and Viscount. He deliberately dis-counted the venerable DC-3 "because it makes all the new planes look so bad."

"Skeets" Coleman explained the reason for the high wing on Fairchild's F-27 as being easier to handle on the ground, better aerodynamic characteristic, good ground propeller clearance, un-impeded view for passengers and crew, and without glare from the upper wing surface. It has the Rolls-Royce Dart engine.

Grumman's Gulfstream features a low wing for "safety and customer demand," said Bernie Harriman. Its certification is expected about October, 1958.

The Lockheed Electra has taken prototype shape at Lockheed's Burbank, Calif., plant. Cabin configuration for airline use accommodates up to 48 passengers. For corporate use cabin configuration can be re-designed.

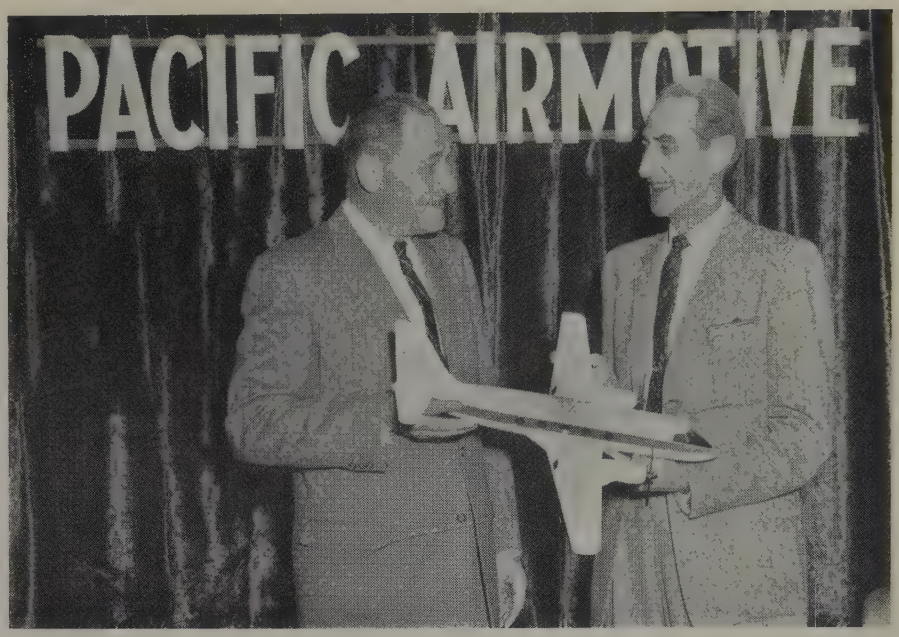
Lockheeds turbo-jet Jetstar cannot be offered to the corporate market until the U.S. Air Force has bought 249 models "of this capability." However, Lockheed has made two tentative corporate commitments. The twin-engine jet can take off and land using a 4,000 foot runway, say Lockheed officials. $6.3 million were allocated for two prototypes, one of which is being test flown at Edwards Air Force Base, Calif., in the charge of Ray Goude, flight test program pilot.

Although Beech Aircraft does not have a turbo-prop plane on the fire, they are looking for a model under the $1 million bracket, John Calhoun said, and with a range of about 1,000 miles at a 350 mph cruise. Price tag aim is $500,000.

The Napier Eland 503 engine model is being fitted to the Convair. It has been approved by British authorities, but it awaits CAA certification tests which are scheduled for the near future, Ken Greely said.

Unique feature of the Allison model 501-D13 turbo-prop is that it is operated at a constant power setting of 13,820 rpm, except during low speed taxiing which is done at 10,000 rpm. By late 1958 there will be some 60,000 development hours on the D13, said J. D. Beaumont.

Lycoming's Dr. Fritz Haber told the group that although the turbo-prop engine cost is 50 percent more than an equivalent piston type engine, it is more efficient and economical to operate at high speeds and for long ranges.



GRUMMAN GULFSTREAM BUYER *Henry Boggess studies a model of the turbo-prop plane which he has ordered from L. B. Littrell, vice president aircraft services div., Pacific Airmotive Corp., Los Angeles, Calif. Boggess is aviation director, Sinclair Refining Co., Tulsa, Okla., which will receive first production-line model of the new business plane.*

Beechcraft D and E 18-S Forum Parley

Heading the group parley on the Beechcraft D and E 18-S models was James M. Grogan, moderator, at mike in photograph, of Pillsbury Mills, Inc., Minneapolis, Minn.

Others in the picture are, from left, J. E. Womack Jr., Beech Service Division, Wichita, Kan.; Phillip Van Treuren, Dairy Pak Inc., Olmsted Falls, O.; W. R. Dotter, International Harvester Co., Chicago, Ill.; R. H. Cuthbertson, J. P. Stevens and Co., Greenville, S. C.; and G. P. Rider, Delta Drill Co., Tyler, Tex.

Invited to participate in the twin-Beech panel were representatives of Pratt and Whitney Aircraft and the Beech Aircraft Corp. The panel was one of five on different aircraft.

Lockheed Ventura and Convair Owner Operators Hold Panel Discussion

LOCKHEED VENTURA AND CONVAIR *panel discussion was led by, from left, L. L. Richardson, L. S. Montigny, Mike Murphy, Robert J. Hixson, moderator, and J. S. (Torch) Lewis. NBAA-ers participating in the afternoon-long program.*

Pilots' points of view on the operations of the Lockheed Ventura and Convair aircraft were presented at a panel discussion during the National Business Aircraft Association convention at Denver, Colo.

Panel members were Les Richardson, Northern Natural Gas Co., Omaha, Neb.; Mike Murphy, Ohio Oil Co., Findlay, O.; Larry Montigny, Dresser Industries, Dallas, Tex.; and Torch Lewis, Thatcher Glass Co., Elmira, N.Y. Moderator was Robert Hixson, Ford Motor Co., Detroit, Mich.

Discussion started with the Ventura which, the group agreed, has received some bad publicity, but, the panel agreed that most of the problems with the Ventura were due to the human element.

The Super Ventura is a pilot's aircraft. It has a surplus of power and climbs out like a fighter. Its single engine performance is excellent. Because of the cleanliness of the aircraft some pilots have experienced difficulty on instrument approaches. The problem they have bumped into has been trying to slow the aircraft down before intercepting the glide path or getting into a holding pattern.

The panel came to the conclusion that this could be overcome by preplanning before entering a high density traffic area. Get the aircraft into a slow flight configuration well in advance of the holding fix. Get the flaps extended and the radios set up. Instrument flying planned ahead is a necessity with the Super Ventura, a problem not associated with the standard Ventura.

Because the Ventura and the Super Ventura have been around for some time and many modifications and changes made, there was discussion of flight techniques. Conclusions were that maximum speed for partial-flap extension are: 5 degrees at 200 mph and full flap at 135-140 mph. Torch Lewis said he uses ⅛th flap at 180 mph. The gear down speed was generally agreed to be 150 mph. As to the use of the speed brake on the Super Ventura, there are no limitations. Below 200 mph, when normal wing flap system is used, the speed brake effectiveness drops off sharply.

One panel member indicated that his Standard Ventura averaged about 88¢ per mile to operate. Larry Montigny estimated his cost at nearly $1.25 per mile.

Les Richardson found that his cost figures for 800 hours of flight operations with Venturas in 1957 have averaged $270 per hour. He added that his aircraft purchase price of $145,000 is written off at a four-year constant rate.

The big question confronting Ventura owners is, what will happen to the price at the end of the writeoff period? In the past, Venturas have been appreciating but, for the first time, Venturas are appearing on the used aircraft market and moving slowly.

D. V. Howard of Howard Aero Inc., San Antonio, Tex., felt that the Ventura market should hold up. His company has bought 21 airframes from South Africa.

Les Richardson uses —31 surplus engines (total of 9 engines in stock).

He adds, however, that efforts to get replacement parts have met head-on with the problem of available surplus parts reaching the "drying up" stage.

Because of this, Northern Natural Gas is now considering changing over to CB-16s which cost less to overhaul.

Members of the panel discussed the brake difficulties on the Ventura. For a long time, brake maintenance has been one of the highest cost items on the Ventura series.

Brake times reported varied from 400 hours to 1300 hours.

E. J. Swearingen of Howard Aero reported that they are working on a brake assembly around the DC-6 brake. It will require a new axle, operate at slightly higher tire pressure (70 pounds) with a 160 pound weight penalty.

The problem of getting reasonable insurance rates on the Standard Ventura has been eased. Recently, it was reported several companies have offered to carry Standard Ventura coverage.

Dresser Industries said they use a low tension ignition system and get 500 hours on their spark plugs instead of the 70 hours previously experienced.

Opening the Convair discussion was Captain Bill Carrier who said that the 440 was easy to fly, has good stall characteristics and performs better in the T category than its predecessors. He reports a slight difference between the 240 and 340. Basically, the 240 is noisier and slightly smaller.

American Airlines and Continental Airlines will soon have Convair 240s for sale. Because of pressurization, interest was shown in these planes as replacement aircraft as well as for transition training to the turbo-prop era.

Bob Hall of Convair said that surplus 240s need only changed interiors to become plush corporate jobs. The engines and airframes are in excellent condition. They have good pressurization systems with the 240 operating at a differential of 3.5 (the 340 maintains 4.16 pounds).

Performance data of the Convair series shows the 440 to be about 4 knots faster than the 340. The 340 and 440 models were designed to hitch on a turbo-prop engine. That program is now in motion. The 240 cannot be so converted.

L. B. Smith Company believes that a 240 full corporate conversion including fuel capacity of 1,000 gallons can run between $100,000 to $200,000.

The structural limit on the 240 is 42,500 pounds and, with a full passenger load, the aircraft is limited in high altitude airport operation. On the other hand, the 440 has a structural limit of 53,200 pounds. When turbo-prop engines are hung on or Fairchild J-44 wingtip jets are used, the high altitude performance is reported to be excellent.

A. W. Kuhn of Pan American, Brownsville, told the panel that exhaust silencers now used on the 340/440 have been very satisfactory and clean up the nacelle to add speed.

Bob Hall edits Convair's field reports and told the panel that the various aircraft have presented no repeating maintenance item.

Cost of a 440, is in the neighborhood of ¾ million dollars.

The operating costs on a mileage basis show a general figure of about 88¢ per mile. One operator told the panel his 340 operating costs, including maintenance were less than his DC-3.

Light Twin Aircraft And Business Flying

Twin-engine aircraft have opened an entire new field of flight operations for companies needing more available flying time, William G. Benedetti of Sprague Electric Co., North Adams, Mass., said in opening a discussion panel on the problem of light twin-engine planes.

Panel members were John P. Meyers, Hubinger Co., Keokuk, Ia.; T. P. Roche, Deere and Co., Moline, Ill.; and A. M. Johnson, El Paso Natural Gas Co., El Paso, Tex.

In discussing specific uses of their company planes . . . when and how the firms started using aircraft . . . the panelists agreed that the light twin offers much greater flexibility than the single-engine plane.

The representative companies all started flight operations with single-engine craft, progressing to the light twins as their flying needs increased.

In comparing equipment, the men revealed similar interests in full instrument panels and propeller and wing de-icers and/or anti-icers. The company planes include Aero Commanders, twin Bonanzas, Lodestars and Cessna 310s.

Maintenance of company planes was divided into two categories . . . progressive and out-of-commission. Opinions varied as to whether it was more practical to take a plane off flying status for two or three days for a thorough check or whether to work on the plane progressively as time and availability permit while it is on flying status.

LIGHT TWIN AIRCRAFT *operations were discussed by owners and operators at NBAA confab. Panelists were, from left, J. P. Meyers, W. G. Benedetti, moderator, T. P. Roche, and A. M. Johnson. A very interested participant was William T. Piper.*

Usefulnes of the airplane in different weather conditions was another topic. Some business planes are limited to VFR weather while others fly "on top," or limited instrument weather, and some fly in complete IFR conditions. It was agreed generally that IFR flying requires two pilots in multi-engine craft. Pilot re-fresher courses were considered valuable by the panelists. However, they concurred, not many such courses are available.

Questions asked by the audience demonstrated the real interest shown by the pilots and plane owner-operators.

The panel was one of a series of discussions of aircraft by type.

Five Moderator-Led Panels at Convention Discuss Douglas, Beech, Lockheed, Convair, and Light Twins

In one afternoon five separate discussion panels were held to talk about aircraft by type.

The moderator-led panel discussions were on specific aircraft operating and maintenance problems. Audience participation by the aircraft owners and operators, maintenance center and factory representatives offered a cross section of practical information from real experiences.

Besides the Lockheed Ventura-Convair panel and the Light Twin Aircraft panel there were panels held for Beechcraft D and E 18-S model operators, for Douglas DC-3 and Lockheed Lodestar-Learstar operators.

The Douglas DC-3 panel was led by moderator Walter C. Pague, executive vice president, ARMCO Steel Corp. The Lockheed Lodestar-Learstar panel was led by William E. Shaughnessy Jr., chief pilot, American Cyanamid Co.

Invited to participate in the Douglas forum were representatives of Pratt and Whitney Aircraft and the Curtiss-Wright Corp.

Representatives of Pac Aero Engineering Corp., Lockheed Aircraft Corp., Curtiss-Wright Corp., and Pratt and Whitney Aircraft were invited to participate in the Lodestar-Learstar discussion.

DOUGLAS DC-3 *operations and maintenance were discussed at forum. Panel was led by moderator Walter C. Pague, standing, ARMCO Steel Corp., Middletown, O. Others on the panel included W. P. Hobson, Hercules Powder Co., Wilmington, Del.; J. V. Swanson, Sears Roebuck & Co., Los Angeles, Calif.; Shelby Maxwell, Burlington Industries, Greensboro, N.C.; and M. L. Nicholson, Mine Safety Appliances Co., Pittsburgh, Pa.*

LOCKHEED LODESTAR-LEARSTAR *discussion forum proved popular. Moderator was William E. Shaughnessy Jr., standing at microphone, American Cyanamid Co., New York, N.Y. With him is R. C. Van Buskirk, Eastman Oil Well Survey Co., Denver, Colo. Representatives of PacAero, Lockheed, Curtiss-Wright and Pratt & Whitney were invited to participate.*

Recipients of NBAA Annual Safety Awards

MILLION-MILE PILOTS: *From left, top row, Coyle, Thurston, Bouteller, Hansen, Piper, Kusse, Hobson; middle row, Van Treuren, Maxwell, Teel, Rokes, Lewis, Korb, Dotter; front row, Lund, Ranaldi, Rider, Sherwood, Prock, Seidner, Mitchell. See below.*

NBAA Member-Pilot Recipients of "Million Miler" Safety Awards.

1,000,000 or more accident-and-injury-free miles flown in business aircraft.

1. **Robert F. Allen,** Frankfort Oil Co., Dallas, Texas 1,550,317
2. ***Harry R. Anderson,** Chrysler Corp., Detroit, Mich. 1,060,000
3. ***William N. Benedict,** Ford Motor Co., Dearborn, Mich. 1,061,566
4. ***David H. Bishop,** Sinclair Refining Co., Tulsa, Okla. 1,102,967
5. ***John A. Bouteller, Jr.,** Service Pipeline Co., Tulsa, Okla. 1,142,322
6. ***Stephen L. Brown,** Continental Can Co., Morristown, N. J. 1,500,000
7. ***Joseph J. Budro,** Champion Paper & Fibre Co., Hamilton, Ohio 1,195,682
8. **Raoul Castro,** International Harvester Co., Chicago, Ill. 1,254,155
9. ***Joseph W. Clemow,** Eastman Kodak Co., Rochester, N. Y. 1,001,236
10. ***Roy L. Coyle,** Parker Pen Co., Janesville, Wis. 1,470,800
11. **Wilfred R. Dotter,** International Harvester Co., Chicago, Ill. 1,186,175
12. ***John R. Dunham,** Continental Can Co., Morristown, N. J. 1,300,000
13. ***Bruce D. Grove,** Gulf Oil Corp., Dravosburg, Pa. 1,074,750
14. ***James G. Guess,** Burlington Industries, Inc., Greensboro, N. C. 1,010,689
15. ***Buford N. Haddock,** Falstaff Brewing Corp., St. Louis, Mo. 1,015,465
16. **Robert L. Hansen,** Kroehler Manufacturing Co., Naperville, Ill. 1,159,200
17. ***Edwin Hefley,** Carthage Co., Shreveport, La. 1,732,000
18. ***Bruce B. Heath,** Continental Can Co., Morristown, N. J. 1,150,000
19. **William P. Hobson,** Hercules Powder Co., Wilmington, Del. 1,249,511
20. ***Charley W. Johnson,** Reynolds Metals Co., Louisville, Ky. 1,517,700
21. **James E. Kidd,** Anchor Hocking Glass Corp., Lancaster, Ohio 1,134,600
22. **A. C. Korb,** Westinghouse Electric Corp., Pittsburgh, Pa. 1,110,000
23. **Robert J. Kusse,** Fruehauf Trailer Co., Detroit, Mich. 1,094,313
24. **J. Sheldon Lewis,** Thatcher Class Manufacturing Co., Elmira, N. Y. 1,265,000
25. ***Edwin C. Little,** Westinghouse Electric Corp., Pittsburgh, Pa. 1,040,000
26. **C. J. Lund,** International Paper Co., Mobile, Ala. 1,233,641
27. **B. Owen Mayfield,** Hercules Powder Co., Wilmington, Del. 1,458,831
28. **S. M. Maxwell,** Burlington Industries, Inc., Greensboro, N. C. 1,186,539
29. ***Samuel A. Merrill,** Goodyear Tire & Rubber Co., Akron, Ohio 1,575,000
30. **George E. Meyers,** Monsanto Chemical Co., St. Louis, Mo. 1,255,613
31. **Norman L. Mitchell,** Minneapolis Star & Tribune Co., Minneapolis, Minn. 1,253,000
32. ***Raymond H. Murphey,** Service Pipeline Co., Tulsa, Okla. 1,008,644
33. **Ralph E. Piper,** Monsanto Chemical Co., St. Louis, Mo. 1,175,100
34. ***Ralph W. Prock,** Cabot Carbon Co., Pampa, Texas 1,224,000
35. ***Richard Ranaldi,** Petan Co., Santa Barbara, Calif. 1,169,070
36. **G. P. Rider,** Delta Drilling Co., Tyler, Texas 1,107,600
37. **Nelson U. Rokes,** The Procter & Gamble Co., Cincinnati, Ohio 2,986,560
38. **Thomas J. Schuetz,** International Harvester Co., Chicago, Ill. 1,234,766
39. ***J. Ralph Seidner,** Goodyear Tire & Rubber Co., Akron, Ohio 2,026,500
40. **George W. Sherwood,** Briggs Manufacturing Co., Warren, Mich. 1,307,160
41. **Don M. Teel,** U. S. Steel Corp., New York, N. Y. 1,042,575
42. **Richard N. Thurston,** Monsanto Chemical Co., St. Louis, Mo. 1,277,161
43. ***Philip Van Treuren,** Dairypak Inc., Cleveland, O. 1,098,475

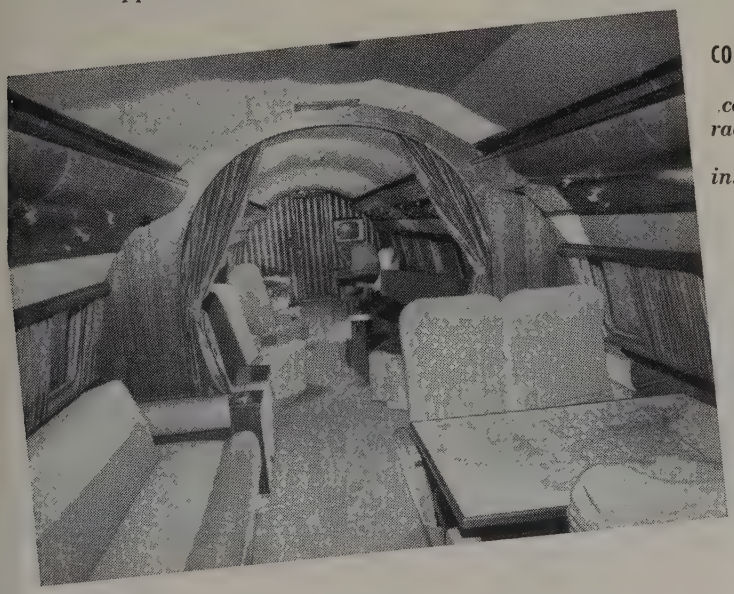
TOTAL 54,998,683

*For first time awarded.

Better performance, comfort and appearance for your business airplane!

CONVAIR 240 INTEGRAL STAIR DOOR, *an AiResearch modification, combines high efficiency with light weight and smart appearance.*

INSTALLATION OF WING TANKS *by AiResearch brings capacity to over 2000 gallons, adding extra hours to range of Convair 340 and 440. (Added fuel capacity also available for Convair 240.)*



CONVAIR 340 or 440 RADAR NOSE *is part of AiResearch conversion which includes radio, autopilot and new instrumentation.*

MAXIMUM EFFICIENCY *as an airborne office is combined with the utmost in comfort in this AiResearch custom interior conversion in a Convair 440.*

Come to AiResearch for the finest in conversion facilities, workmanship and service

The Convair conversions illustrated are typical of hundreds made on all types of business aircraft, including DC-3s, DC-6s, Lodestars and D-18s. A single visit to AiResearch Aviation Service can solve any conversion, modification or servicing problem you may have.

Here, in more than 150,000 square feet of floor space, we can install new instruments, larger engines, extra fuel tanks, the finest in radio and radar equipment and new, complete electrical and hydraulic systems. And we can provide the finest interiors custom-tailored to your individual requirements.

In addition, we can satisfy all your service needs from turn-around service to complete overhauls. You are invited to inspect our facilities. Please write or telephone for full information.

THE GARRETT CORPORATION

AiResearch Aviation Service Division

International Airport, Los Angeles, Calif. • Telephone: ORegon 8-6161

Conversion and Modification • Custom Interiors • Electrical and Instrument • Radio and Electronics • Engineering Service • Turn-Around Service

NBAA Member-Company Recipients of 1,000,000 Mile Safety Awards.

1,000,000 or more accident-and-injury-free miles flown in business aircraft.

1. ***Aluminum Company of America,** Pittsburgh, Pa. 1,083,820
2. ***American Can Co.,** New York, N. Y. 1,042,070
3. **Anchor Hocking Glass Corp.,** Lancaster, Ohio 1,630,000
4. **ARMCO Steel Corp.,** Middletown, Ohio 1,352,721
5. ***Associated Aviation Underwriters,** Dallas, Texas 1,187,300
6. ***Beloit Iron Works,** Beloit, Wis. 1,340,000
7. **Burlington Industries, Inc.,** Greensboro, N. C. 4,013,507
8. ***Cabot Carbon Co.,** Pampa, Texas 1,218,122
9. ***Cluett, Peabody & Co., Inc.,** New York, N. Y. 1,871,888
10. ***Colorado Interstate Gas Co.,** Colorado Springs, Colo. 1,243,950
11. **Welta Drilling Co.,** Tyler, Texas 1,107,600
12. ***The Diamond Match Co.,** New York, N. Y. 1,815,000
13. **Eastman Kodak Company,** Rochester, N. Y. 1,090,304
14. ***Falstaff Brewing Corp.,** St. Louis, Mo. 1,015,465
15. **Ford Motor Co.,** Dearborn, Mich. 3,375,000
16. ***Goodyear Tire & Rubber Co.,** Akron, Ohio 5,000,100
17. **S. J. Groves & Sons Co.,** Minneapolis, Minn. 1,273,200
18. **Hercules Powder Co.,** Wilmington, Del. 2,531,450
19. ***International Business Machines Corp.,** New York, N. Y. 1,084,446
20. **International Harvester Co.,** Chicago, Ill. 2,280,433
21. **International Paper Co.,** Mobile, Ala. 2,135,898
22. ***C. J. Langenfelder & Son., Inc.,** Baltimore, Md. 1,040,600
23. **Mine Safety Appliances Co.,** Pittsburgh, Pa. 1,744,200
24. **Minneapolis - Honeywell Regulator Co.,** Minneapolis, Minn. 1,809,650
25. **Minnesota Mining and Manufacturing Co.,** St. Paul, Minn. 1,891,852
26. **Monsanto Chemical Co.,** St. Louis, Mo. 4,861,258
27. ***Noland Co., Inc.,** Newport News, Va. 1,045,170
28. ***Northern Natural Gas Co.,** Omaha, Neb. 2,680,000
29. **The Ohio Oil Co.,** Findlay, Ohio 1,706,245
30. **Owens-Illinois Glass Co.,** Toledo, Ohio 2,222,411
31. ***The Parker Pen Co.,** Janesville, Wis. 2,219,700
32. ***Petan Co.,** Santa Barbara, Calif. 1,169,070
33. **Phillips Drilling Corp.,** ration, San Antonio, Texas 1,525,083
34. **Procter & Gamble Co.,** Cincinnati, Ohio 2,169,540
35. **Reynolds Metals Co.,** Louisville, Ky. 2,778,800
36. **Southern Natural Gas Co.,** Birmingham, Ala. 2,472,536
37. ***Sundstrand Machine Tool Co.,** Rockford, Ill. 1,491,046
38. ***Texas Eastern Transmission Corp.,** Shreveport, La. 2,067,195
39. **Texas Gas Transmission Corp.,** Owensboro, Ky. 1,360,000
40. ***Thatcher Glass Manufacturing Co., Inc.,** Elmira, N. Y. 1,010,000
41. **United States Steel Corp.,** New York, N. Y. 2,010,450
42. **Westinghouse Electric Corp.,** Pittsburgh, Pa. 1,750,000

TOTAL 79,716,630

*For first time awarded.

NBAA Member-Pilot Recipients of 500,000 Mile Safety Awards.

500,000 or more accident-and-injury-free miles flown in business aircraft.

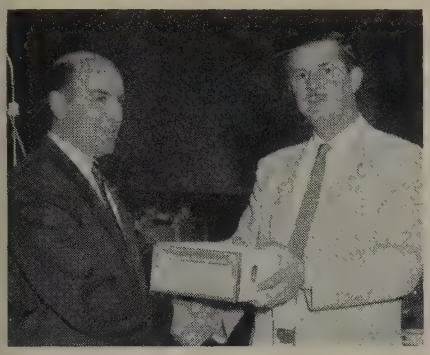
1. **Wilbur D. Adams,** The Procter & Gamble Co., Cincinnati, Ohio 804,600
2. **Warren E. Ames,** Hercules Powder Co., Wilmington, Del. 617,852
3. **Howard E. Ahrns,** The Ohio Oil Co., Findlay, Ohio 907,395

(Continued on page 47)

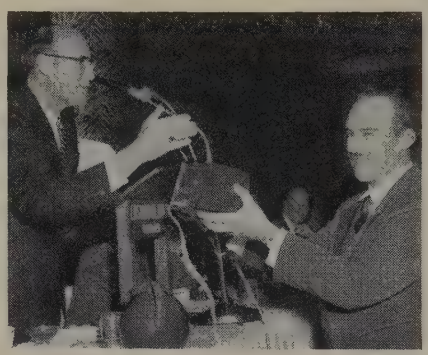
AVIA-QUIZ

Convention Winners

Skyways thanks the board of judges for helping with the convention portion of Skyways' Avia-Quiz contest. The judges were Robert S. Scott, Airwork Corp., Cleveland, Ohio; S. C. Atkins, Sperry Gyroscope Co., Great Neck, N.Y.; D. H. Robinson, Radio Corp. of America, Los Angeles, Calif.; D. M. Teel, United States Steel Corp., White Plains, N.Y.; and John Breickner, Bendix Red Bank Division, Eatontown, N.J. Not shown below is seventh winner Jim Phelps, of Lear, Inc., awarded Ray Ban Glasses.



PAUL VANCE, *left, Monsanto Chemical Co., St. Louis, Mo., wins first prize, a portable Transair Radio-Record Player, given by Sperry Gyroscope Co., Great Neck, N.Y.; presented by S. C. Atkins of Sperry.*



JOE LACEY, *right, Sinclair Refining Co., Tulsa, Okla., wins second prize, a clock-radio given by Radio Corp. of America, Los Angeles, Calif., and presented by NBAA president, Joe Burns.*

FRED BURGER, *right, Flight Safety, Inc., Flushing, N.Y., wins third prize, an Emergency Evacuation Light, given by Crown Lighting Corp., New York, N.Y.; presented by E. T. Carrington, Crown pres.*

ARTHUR LIPPA, *U.S. Steel Corp., White Plains, N.Y., fourth, wins an electric shaver given by Remington Rand Co., New York, N.Y., and presented by Herb Ackerman, left, of Skyways.*

E. S. TAYLOR, *left, Riegel Textile Co., New York, N.Y., fifth, wins a case of Oakite Cleaner given by Oakite Products Inc., New York, N.Y., and presented by Robert Scott, Airwork, Cleveland, Ohio.*

ROBERT F. HINDS, *right, The Chemstrand Corp., Decatur, Ala., wins sixth prize, an Airline Log Book, given by Skyways magazine, sponsor of the contest, and presented by Lindy Boyes of Skyways staff.*

The CAA's Business Flying Program

The Civil Aeronautics Administration's new business flying training-aid program was discussed by CAA representatives with members of the NBAA attending the tenth annual convention at Denver, Colo., last month of the NBAA.

CAA panel members were W. Buril Barclay, CAA general safety division specialist in business flying, air taxi, lighter-than-air and jet operations; Wesley H. Brubaker, CAA inspector, Third Region; and James A. Leckie, CAA inspector, Fourth Region.

Aircraft operator panel members were Joseph L. Lacey, Sinclair Refining Co., Tulsa, Okla., and John A. Boutelle Jr., Service Pipe Line Co., Tulsa, Okla. Ralph E. Piper, NBAA Board member and with Monsanto Chemical Co., St. Louis, Mo., was moderator.

Although Buril Barclay said of the CAA, "We 're not in the instruction business, but we are certainly in the safety business," being in "safety business" puts CAA inspectors close to the instruction business.

Barclay said that the CAA is aiming for a six-month or one-year periodic proficiency check flight program for all instrument rated pilots. But with present lack of personnel, such a program is not possible.

Jim Leckie pointed out, however, that even though there is no requirement for a six-month check, he has many requests by pilots for a check flight.

Leckie complies and goes even further. He keeps a list of company pilots to whom he has given check flights. When six months have passed he notifies the firm. He says that a very cooperative attitude exists.

Leckie has inaugurated a program of route checks. As often as his work will allow him, he travels with corporate pilots on complete runs, observing procedures and techniques. After the trip, Leckie compiles a report and discusses the flight with the pilot.

Jim Magnus, Minneapolis Honeywell Regulator Co., asked Leckie to discuss the problem of high eye-cue in heavy traffic areas.

Leckie told the panel that he has watched pilots changing radios and they have gone as long as a minute and a half without a scan.

The question was brought up before the panel about "Single engine and/or single pilot instrument flying."

Bill Allen of Ray-O-Vac said that an autopilot is an essential factor in lieu of a copilot to reduce fatigue prior to penetrating high density traffic areas.

Ralph Piper said the difficulty with single pilot performance is trying to be expeditious on instruments, copying clearances, checking holding points and figuring out where the aircraft is "on the Jeppsen fine print."

There were various members who told the panel that a single pilot operation was the only economical way

(Continued on page 47)

SKYWAYS FLIGHT OPERATIONS ROUND TABLE

PRATT & WHITNEY—AIRWORK

MILLVILLE AIRCRAFT OPERATIONS SYMPOSIUM

(Condensed in this issue and substituted for the Regular Round Table.)

September 19 and 20, 1957

Bogus parts can be dangerous, in fact have caused fatal accidents, Joe Chase, Flight Safety Foundation, said in discussing "The Problem of Bogus Parts," at the Airwork Operations Symposium and Pratt and Whitney Aircraft Forum held at Millville, N.J.

Other subjects discussed included carburetors, mixture controls, Continental and Lycoming engines and the Curtis Report.

Apparently "bogus" parts came into being when some surplus parts lost their identity during a chain of shipments. Unidentified, the parts were unacceptable by the CAA. Rather than throwing out the parts, the owner somehow marked them and sold the items through a sort of black market.

As long as the genuine item was being marketed, there wasn't a real "bogus" problem. However, once the genuine item was nearing depletion, the development of a counterfeit surplus parts business took over.

Some surplus items that had no useful purpose were, and still are, re-tooled to resemble closely enough a usable part and sold as such. Such "bogus" parts . . . boot-legged . . . don't hold up under any wear, stress or even any normal mounting strain in some cases.

Parts approved for use are marked CAA PMA . . . Civil Aeronautics Administration, Parts Manufacturer Approved.

Parts that were rejected, Chase continued, were finding their way ultimately to repair shops. Now most, but not all, rejected parts are mutilated by the manufacturer before disposal.

Bogus parts manufacturers sometimes do not keep up to date on the latest regulations regarding changes, thus getting themselves into trouble.

Some examples of bogus work are threads on bolts being cut rather than rolled; spark plug bushing which had threads not only cut but to right rather than to left.

Pratt and Whitney surplus engines make up the greatest field for bogus parts, Chase said. Detection of bogus parts is nearly impossible by the airplane owner or operator.

For protection, Chase recommends that parts should be purchased from only known and reputable sources and that reliable repair agencies do the work. "Make price last and not the primary concern for safety, reliability and lasting wear," he concluded.

• • •

Lock York, Field Installation Engineer for Continental Motors, started the two-day session with a discussion on mixture control. "There's a lot of talk about high engine temperatures when leaning the mixture too much," York said. "This is not necessarily so; only when the engine is hot to begin with."

The normal procedure for leaning the gasoline-air ratio is to lean the mixture until the engine sounds rough; then enrich the mixture to the point where the engine runs smoothly. York stressed that this must be done accurately when done by ear, otherwise the advantage of the mixture control can be lost.

"Some engines," he said, "run roughly as normal. In fact, economy can be affected by letting the engine run just a very little bit rough from leaning the fuel-air mixture."

"At cruise the engine temperature will diminish with leaning rather than increase," said York, adding that an "air-cooled engine can be destructively over heated without warning. There is no safety factor between the danger and safe operating areas on the temperature gauges. The critical area is at the ring valve when the oil has gone . . . fire is no lubricant," York declared.

"With present carburetors" York said, "mixture can be leaned any time the engine is running if performance will be improved. This is in opposition to the old rule of not leaning under 5,000 feet. The cylinder head temperature gauge is the best aid for leaning," York concluded.

• • •

Answering questions at the Open Forum Discussion on Continental Engine Problems were Harry Hughes, Ray Fencl, L. J. Holland and Lock York, all of Continental.

Q: What is the minimum octane fuel to be used in the H-model Bonanza?

A: 91 octane or 100 as an alternate.

If it is necessary to mix octanes such as 91 and 100, the end result will probably be a 95 octane mixture, if it is thoroughly mixed, because the lead content is about equal. (York)

Q: Why lean mixtures only above 5,000 feet?

A: This is suggested for inexperienced pilots. They will have less chance of getting into trouble. Leaning under 5,000 feet should be done only at cruise speeds. (Fencl)

Higher atmospheric pressure exists under 5,000 feet. This can cause the engine to run 100 per cent plus, if throttle is full on.

Q: How should carburetor heat be applied?

A: Normal recommendation for carburetor heat is either full-off or full-on.

Partial use can be dynamite for inaccurate readings. (York)

Q: What is a normal operating oil temperature?

A: 175° is a good oil temperature performance for any plane. (York)

Q: What is a recommended ground run-up time?

A: A minimum ground run-up is recommended so as not to burn out cylinders. If the engine takes the power on checking, it's ready to fly. The air-cooling effect is not on the ground but in the air. (Fencl and York)

Q: What is the effect of a long let-down at reduced power?

A: It is no longer significant; cylinders can take it. (York)

Q: How can the consistent use of an octane higher than that for which the engine is rated be reconciled?

A: Use a spark plug for higher burning temperatures, if the higher octane is for regular use. There is no readable difference in using higher octane; only noticeable in using a lower grade. (York)

Q: Why do you recommend only the full-off or full-on use of carburetor heat?

A: The carburetor heat is a simple valve arrangement that can close off cold air, take in hot air and vice versa. To modulate the amount of heat is difficult. The factory has four gauges to check temperatures in carburetors. In most airplanes, the pilot cannot judge variations. The result is the On or Off positions. (Fencl and York)

Dale Keltner, Bendix engineer, discussed some of the field problems with the Bendix PS Series Carburetors.

He pointed out that excessive mag drops can be corrected temporarily, sometimes, by carburetor adjustment. (ie: Mag drops from bad points, leads or wiring of carburetor.) A richer mixture can overcome this condition.

Inadequate acceleration can be improved by a rich mixture. In long glides or reduced power operation, the engine should be cleared often.

The automatic mixture control that is familiar to owners of the H-model Bonanza has a manual control also. However, the manufacturer recommends

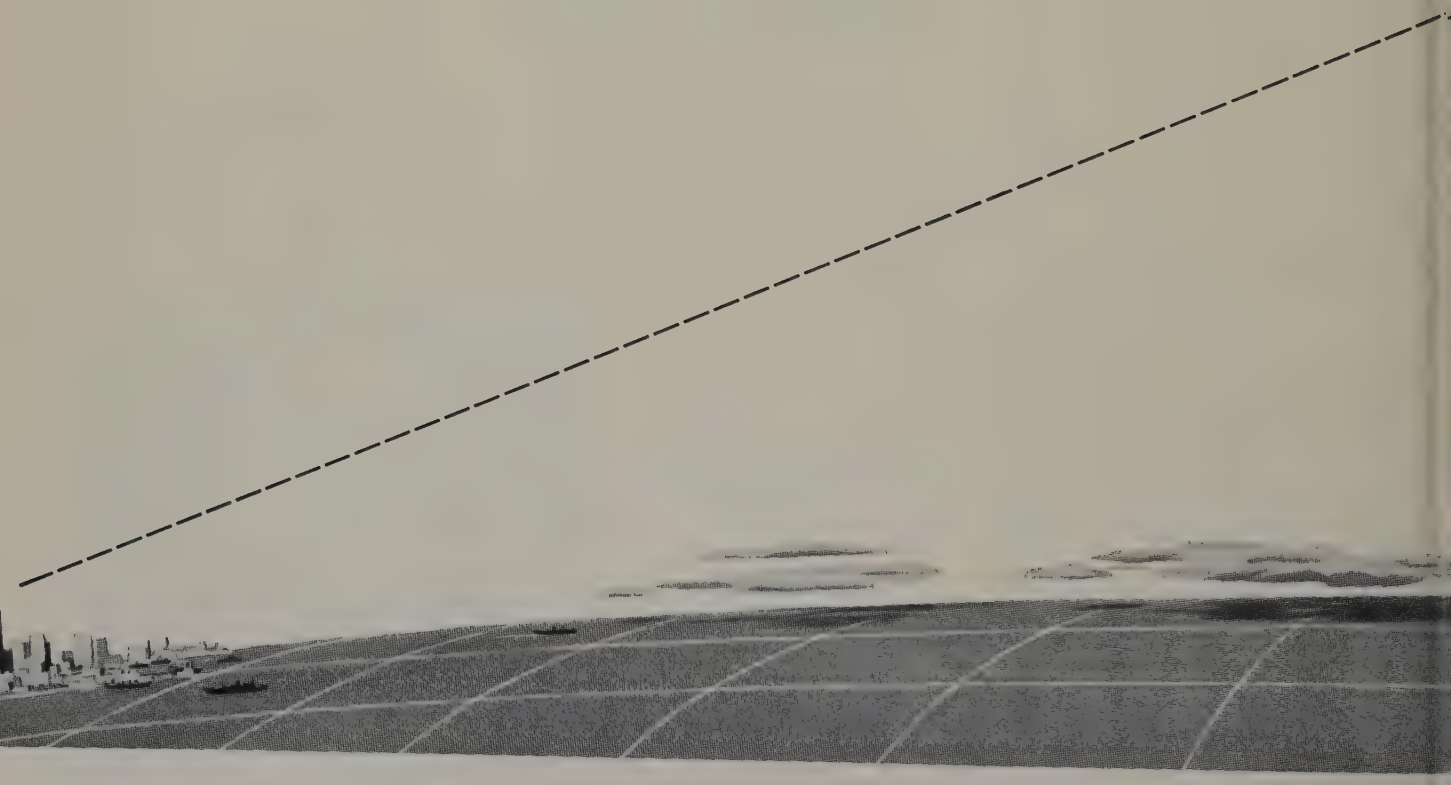
(Continued on page 60)

In The Airwork Discussion Tent Small Parleys With Many Questions Took Place

LYCOMING *attracted visitors with its engine display. Questions were answered by Bill Russell, Joe Diblin and friends.*

AC SPARK PLUG *held a serious small-scale round-table discussion. Jack Church, sales mgr., gave illustrated slide talk.*

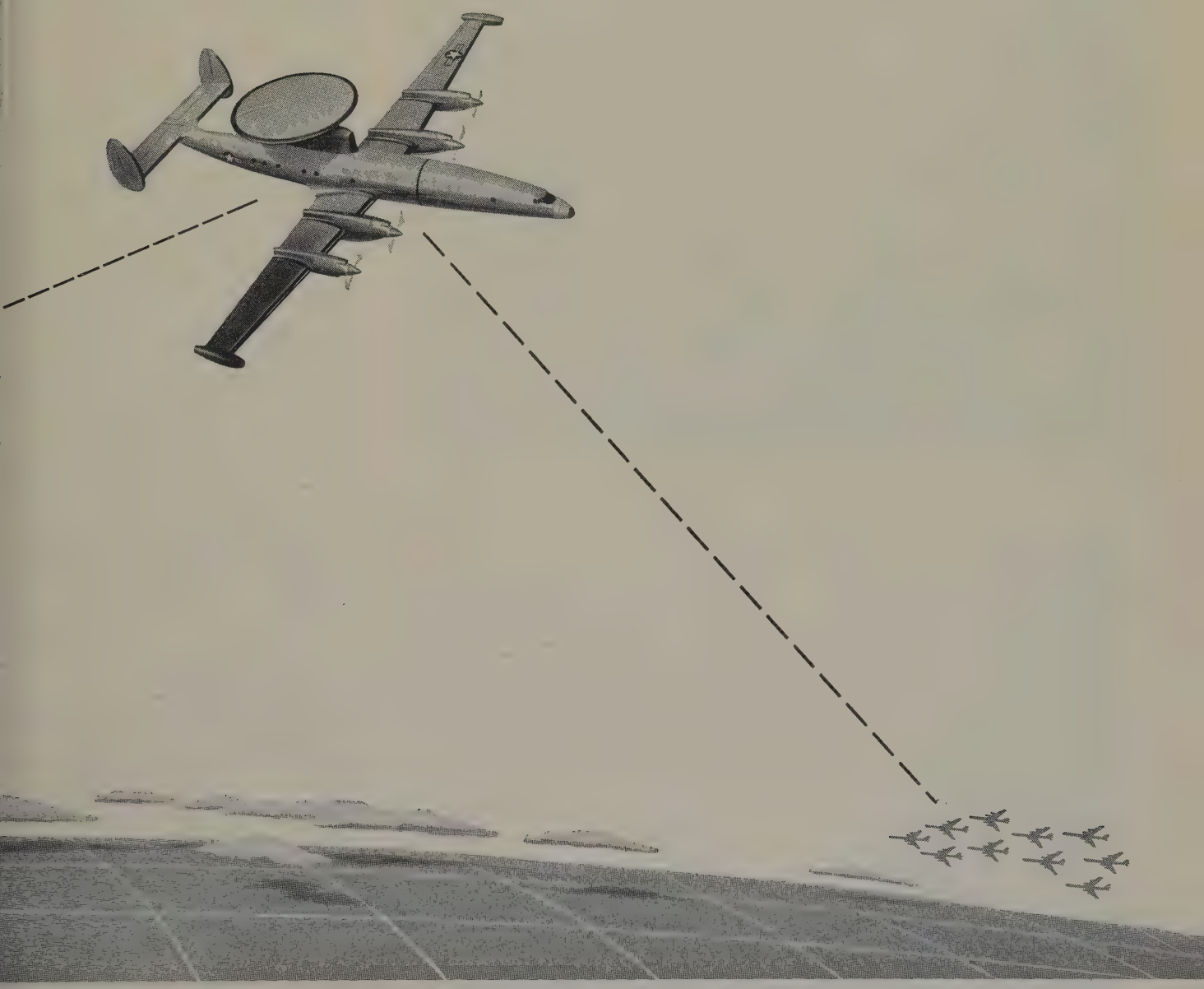
B. F. GOODRICH *De-icer exhibit was in hands of D. S. Malmberg. Problems were discussed and thawed for interested pilots.*



Time... the vital dimension

Ability of the United States to defend itself against attack, and to retaliate against an aggressor, are both vitally dependent on *time*. Every hour, every minute, every second of advance warning time is precious.

Our vast Continental Air Defense system, our powerful Strategic Air Command, our mighty fleets, and world-wide retaliatory striking forces all depend on



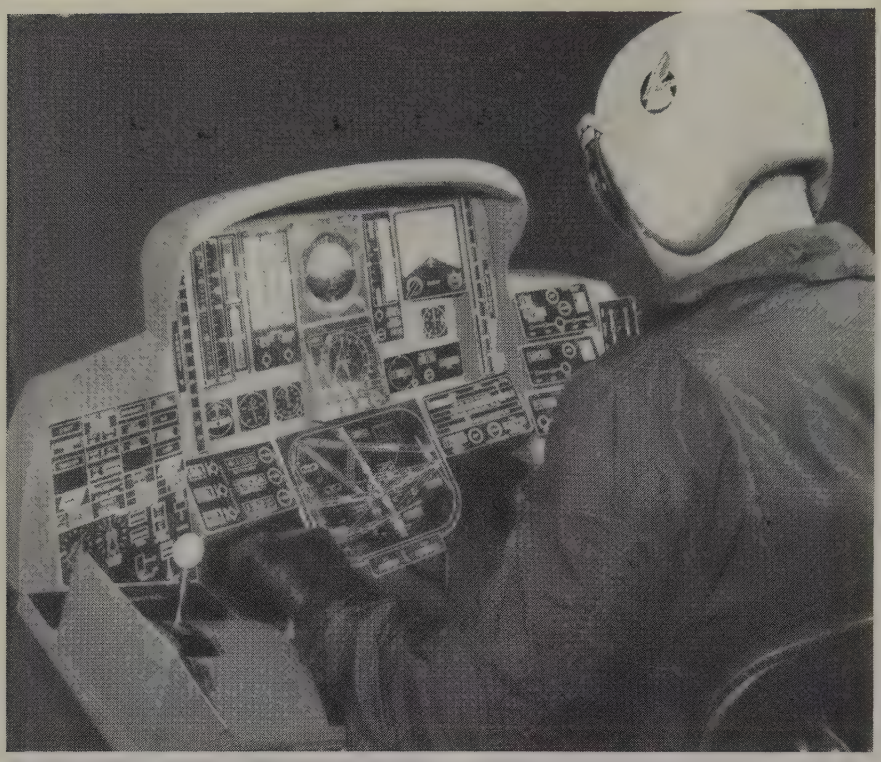
irborne Early Warning (AEW) aircraft to alert
em—the moment suspicious planes or ships are
ghted approaching our far-flung defense barriers.

ble to "see" 150 miles (in all directions) through
ense fog or total darkness, AEW patrol planes have
role so crucial that without them our nation's de-
nse capabilities would be seriously handicapped.

America's safety depends on maintaining our Airborne Early Warning patrols at optimum efficiency and strength

LOCKHEED *means leadership* CALIFORNIA DIVISION, *Lockheed Aircraft Corporation, Burbank, California*

NAVICOM



LEAR PICTORIAL PANEL DEVELOPMENT *progresses, the firm reports. Requirements for the panel were established by WADC Flight Control Laboratory. The design philosophy is to plan instruments as a part of the cockpit and to design the cockpit around the pilot so that the information and the controls he needs will be readily available.*

Bell Automatic Landing System Promises Increased Airport Acceptance Rates

It is general knowledge that since the introduction of radar approach control, successive aircraft can arbitrarily be placed on the final approach path at any desired minimum interval. What happens after that is another matter.

Factors determining this interval include varying approach speeds of mixed aircraft types; differences in pilot techniques and skill in "tieing down" and maintaining the ideal approach path; the psychological effect of minimums on the amount of longitudinal separation "bought" by the pilots and/or ATC; adequate facilities for rapid clearing of the landing runway for successive use and the need to share the runway with departing aircraft.

Hence, claims of proposed new systems of expediting landings, quoting figures of 120 per hour or more, make practical civil air operations people annoyed. The "ifs" are many—"if a dual runway system is available," "if practical in terms of approach and departure path conflictions," "missed approach procedures," "ground handling considerations," "standardization of civil pilots operational techniques," and many others.

However, improvement of any factor in airport acceptance rate is a step forward. Such a step, as described by William McShultz, Bell Aircraft Research Division, Buffalo, N. Y., was demonstrated in August when, for the first time in aviation history, an F3D jet fighter was landed aboard the aircraft carrier Antietam by a system combining radio and radar without the pilot touching the controls.

Previous to its use aboard the carrier, the Bell system had landed various types of military and commercial aircraft more than 1,800 times at the Niagara Falls airport and at military installations.

The Bell system combines radar and radio. It takes over from the pilot while the airplane still is some distance from touchdown on runway or carrier deck and brings the plane in for a safe landing. It has been developed for use even when IFR operations are normally suspended because of very dense fog or other unfavorable weather conditions. The pilot need not see the airport or aircraft carrier before the landing is *completed.*

During the Antietam trials, radar located the F3D and determined its altitude and location with relation to the carrier deck. An electronic computer does the rest, sending the necessary course corrections to an automatic pilot which directs the airplane into the desired flight path. When the Bell Aircraft system "locks on" to the airplane, the pilot immediately relinquishes control and rides the airplane as a monitor all the way to touchdown.

If the carrier deck is not in the proper position for a safe landing, the system automatically gives the pilot a "wave-off" and the airplane is flown around the landing pattern for another attempt. During tests at the Niagara Falls airport, the system landed a Navy pilot repeatedly during blinding snow squalls.

Automatic ILS has been in operation for some time and many pilots have flown it either in the military or in civil use. Although the coupler does a good job at flying the glide path, the pilot is still required to make the critical transition from the approach to the landing manually. Logically, once the approach is begun automatically, it should be continued automatically until the airplane has touched down and rolled to a safe position.

In 1950, the Navy set out to achieve completely automatic control of all airplanes from 200 miles to touchdown on the deck of an aircraft carrier, under all conditions of weather. An essential part of this program called for a system which could accept an airplane in a final approach zone and bring it to a successful landing automatically. An additional requirement was that the system land airplanes at 30 second intervals (120 per hour). There was to be *no human* anywhere in the loop. This system is designated the AN/SPN-10. The Air Force AN/GSN-5 system is a land-based variation utilizing the same basic principles.

In this closed loop system, a radar automatically tracks the approaching aircraft and supplies very precise positional data to a computer. The actual flight path thus measured is compared with the desired flight path and correction signals are determined. The correction signals are fed, through a data link, to the autopilot which controls the airplane to the desired path. This control continues for as long as the pilot *desires*—either until the landing has been completed or until visual reference has been established. During the critical transition period from approach to landing, the pilot is *not* required to assume control of the airplane, however, he *may* do so instantaneously if he so desires.

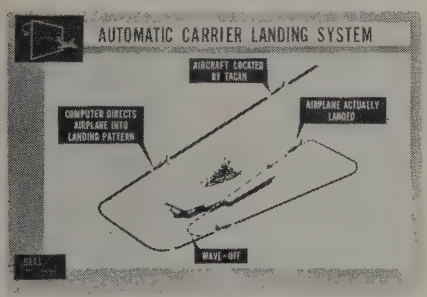
Air-borne equipment is held to a minimum to insure simplicity of operation and maintenance while providing maximum reliability. Any standard autopilot and data link meeting commercial or military requirements may be used. Airspeed control (primarily a throttle servo system) is optional and extensive tests indicate that it is not required for land-based operations. The only other equipment required would be a small corner reflector mounted on the landing gear to provide a point target for accurate position measurement.

In the event of airborne equipment failure, the ground facilities and voice

CARRIER LANDING *near equipment trailers demonstrates confidence of pilot and personnel in automatic landing system. Plane is F3D Skyknight.*

communication supply data equivalent to that provided by present GCA approach systems. Automatic wave-off is provided in case of equipment malfunction or excessive errors.

The standard ILS approach system can be adapted for use as a data link with this system. The radar tracks the aircraft and computes its deviation from the desired flight path. Instead of translating the corrections into pitch and roll signals for the data link, the deviation signals are used to *modulate* ILS localizer and glide slope frequencies, and thereby tie in the autopilot through the existing approach coupler. By eliminating the inherent inaccuracies and variable gains associated with the beam, automatic landings can be achieved. Several hundred such landings have been made *without any alteration* to existing aircraft installations.



Nearly 2000 fully automatic landings have been made with airplanes including the DC-3, Convair 340, Cessna 310, B-23, F-86 and F3D. Systems reliability has been excellent. The philosophy of using off-the-shelf components and existing techniques has resulted in maintenance time of less than 0.1% of total operating time.

The Navy requires that the automatic system land the airplane within a distance *not exceeding* a standard deviation of plus- or minus-30 feet longitudinally and a maximum of plus- or minus-25 feet laterally from a preestablished landing spot on the deck. During 120 landings made on an airport runway, the system landed an airplane with an average longitudinal dispersion *of less than 18 feet.* Lateral dispersion was *negligible.*

Bell Aircraft engineers point out that the system has significant commercial as well as military application and would permit operations at commercial airports when weather conditions prevent pilots from making visual landings.

Air Force-Columbia Univ. Reveal Significant Radar Advance

The state of the world being what it has for the last two decades or more, it is axiomatic that the major advances in aviation and related electronics have come through the urgency of national defense.

The latest is a joint announcement by the U.S. Air Force and Columbia University of the development of new techniques increasing the power of radar in "extremely large, effective amounts." The effective increase was disclosed as "many hundreds of times" by comparison with World War II radar designs, some of which are still in use in traffic control centers. The step was called "probably the greatest radar advance since start of W.W. II."

The new techniques devised by Columbia scientists, it was explained, do not actually increase the power used, but instead employ a method of "signal enhancement" which raises the strength of a radar signal reflected from an aircraft or a missile "to an unprecedentedly high level." This was described as being of particular significance for radar installations in regions like the Arctic, where it is extremely difficult to supply fuel and other facilities for producing large amounts of power.

Since the strength of a radar echo decreases as the fourth power of the distance to the target, older radar tech-

(Continued on page 58)

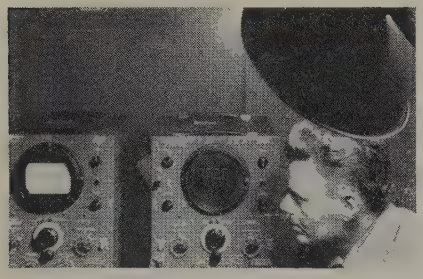
SAFETY EXCHANGE

Black-Background Scope Step Toward Safer Radar

One major drawback in current radar, both ground and airborne, is the vulnerability to even low daylight levels. Hooded scopes in cockpits tend to encourage that "head down and locked" practice so deplored.

On the ground, ATC radar controllers operate in hot, poorly ventilated "tents" or darkened, depressing "IFR rooms." This discourages the use of more accurate radar orientation in lieu of less accurate visual control.

"Daylight" scopes are sought for both uses. Hence, the announcement by



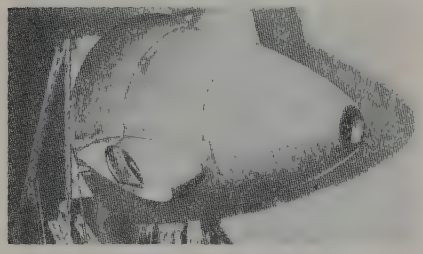
Du Mont Laboratories of a high contrast, black-background CRT screen is an important step. The Du Mont black-background picture screen shows image retainment while standard cathode-ray tube screen at left is blanked out by high powered flood light.

More On "Spraymat" Anti-Icing

PacAero Engr'g. Corp., wholly-owned subsidiary of Pacific Airmotive, has released more details on their "SPRAY-MAT" process.

"Spraymat" is a patented system for electrical de-icing and anti-icing. It can be applied to almost any surface requiring this protection.

A standard-type application consists of a base of insulating resin sprayed over the surface to be protected, a layer of metallic heater element sprayed in



a predetermined design pattern and a final protective coating of insulating resin. The result is a mirror-like finish approximately 1/20th inch thick and weighing about .3 lbs per square foot. It can be applied to the most complex shapes in either white or silver.

The system is automatic due to sensing devices which detect icing conditions and start operation of the system. Since there are no moving parts, and the protective coatings are impervious to fuels, lubricants and hydraulics and highly resistant to rain, ice and dust, Spraymat is practically foolproof.

Twin Engine Emergency Warning In CAA Safety Release

Twin-engine airplanes are operated by many pilots who have little formal transition training and no apprenticeship as second pilot in multiengine airplanes, states CAA Aviation Safety Release No. 400.

For safety in twin-engine airplanes, familiarity with two speeds is vital:

1. Engine-out minimum control speed.
2. Engine-out best climb speed.

Three important principles to remember in twin-engine airplanes are:

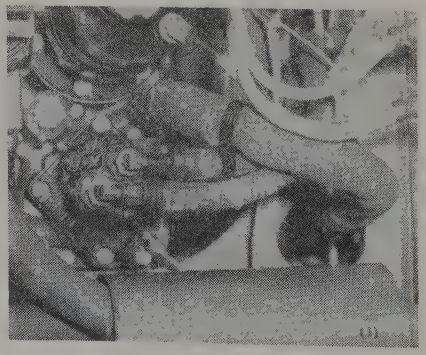
1. Altitude is more valuable to safety after takeoff than is airspeed in excess of the best rate of climb speed;
2. Climb or continued level flight is impossible with gear extended and a propeller windmilling in many current twin engine planes;
3. After an engine failure at cruises meto power should be applied immediately.

See the manufacturer's airplane flight manual for engine-out minimum control speed and best climb speed, suggests the safety release.

It concludes that the pilot should familiarize himself with the general procedures for use in the event of a sudden engine failure during takeoff, climb-out or cruise flight.

Fire-Proof Plumbing Saves On Aero Commander

A fireproof plumbing installation exceeding CAA requirements and giving three times the service life of the original hose application was made recently on an Aero Commander of the 680-S class. Using Aeroquip 601 Lightweight Engine Hose, and Aeroquip 624 Fire-proof Sleeving, the new installation replaced MIL-H-5511 medium pressure lines. The replumbing permits greater flexibility and shorter routing of lines with savings in both space and weight. 32 601 lines replaced 34 original lines, 24 forward of the firewall, 10 aft. The overall savings of weight on the hose was almost seven pounds, 21% of the weight of the old installation. This allowed fitting with fire-sleeve, weighing almost nine pounds, giving greater fire protection and increased service life at a net weight addition of two pounds, with only half in the engine nacelle. Fireproofing with the original installation would have added a penalty of almost nine pounds in the engine nacelles alone.



AFTER *conversion to Fireproof Installation.*

Complete information about the replumbing of the Aero Commander may be obtained by requesting Aircraft Service Report #103, Aeroquip Corporation, Jackson, Mich.

Skid-Warner Prods Pilots

A foot-thumping warning device has been developed to keep aircraft pilots on their toes—safety-wise. It is a skid-warning system, introduced by the Aviation Products Division of the Goodyear Tire and Rubber Company, which senses an impending skid and warns the pilot by rapping the bottom of his foot with a plunger.

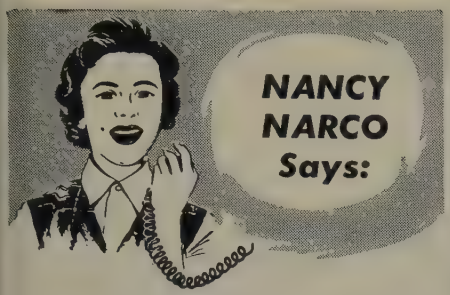
The "foot thumper," which projects through a hole in the brake pedal, is triggered when a sensory device in the wheel axle detects an abrupt wheel slowdown (such as a wheel lock-up) during a braked stop. In staccato fashion, the vibrating plunger thumps the pilot's foot until he eases up on the brake pressure.

The system, extensively tested by airlines and by simulating aircraft landings on company dynamometers, ends inadvertent tire blowouts and flat spots, shortens landing distances, and at the same time enables the pilot to maintain safe, complete control of his aircraft.

Made to fit existing brake systems without modification, the Goodyear skid-warning system can be given an operational check-out prior to takeoff or landing.

Fire-Test Laboratory

In a significant step to further aviation performance and safety, Resistoflex Corporation of Roseland, N. J., has just opened a new Fire-Test Laboratory for the testing of aircraft hose assemblies and other components under in-flight fire conditions. The company,



Surprising number of pilots, especially students and new plane owners, are understandably confused about frequencies and basic communications—particularly now that even our little Superhomer has a 12-channel transmitter. Here's a quick rundown:

1. *To Talk to Towers.* Transmit on 122.5, the frequency universally used except in a few busy terminal areas where some airports guard 122.6 or 122.7.

Or you can talk to the tower Simplex-fashion. That is on their same frequency. That frequency, the one to which you should be tuned to receive the tower, is shown on the chart in the box giving information about the airport in question. The VHF frequency is the first blue figure which appears after data on elevation and runway length.

2. *On the Ground.* Ground control at busy airports uses either 121.7 or 121.9—the tower will tell you which. If you have these frequencies talk and listen on ground control except near the active runway.

3. *En Route.* To call a CAA station (not a tower) going cross-country, call them on 122.1. They will talk to you either on their Omni or LF range frequency or on 122.2 if you so request. Some Omnis are operated remotely from another station, so don't be surprised if you call "Stroudsburg Radio" and have "Allentown Radio" reply. Some Omni stations have no voice, and are so indicated on the chart.

CAA stations can also communicate on Simplex on 126.7 if you request it.

4. *Emergency.* All towers, CAA stations, military airports, radars, etc. guard and transmit on the emergency frequency 121.5.

5. *Unicom.* Talk to and listen to airports equipped with a Unicom ground station on 122.8 or the new 123.0 for Unicom installations at airports with towers.

6. *Frequencies You Need.* In most cases and places you could still get by with 122.1 and 122.5. Nine frequencies will get you anywhere: 121.5 emergency; 121.7, 121.9 ground control; 122.1 en route; 122.5, 122.6, 122.7 towers; 122.8, 123.0 Unicom.

You might want to clip this as a helpful reminder.

Happy Megacycles,

Nancy

NARCO • Fort Washington, Pa.

P.S. If you'd like a FREE Copy of our little booklet "How to Fly Omni," just write me, c/o Narco, Fort Washington, Pa.

narco Sapphire 1016

90 or 360 CHANNEL TRANSMITTER
90 or 560 CHANNEL RECEIVER

When you see an aircraft with the Narco Sapphire 1016 antenna you know it's equipped with the ultimate in fine communications. Designed for reliable VHF communications on every frequency provided for present and future civil aircraft communications, the 1016 has a VHF transmitter capacity of 90 or 360 channels and crystal-controlled receiver of 560 channel capacity. Precise 50 kc separation is provided through the entire range from 108 to 135.95 mc.

The Sapphire 1016 is CAA-certificated for airline use and matches the quality, performance and dependability of the finest airline-type equipment. Yet its price compares with limited channel equipment normally used in executive aircraft.

1016 unit occupies ½ ATR rack; total weight 24¾ lbs.

NOW! PRECISION VOR/ILS CONVERTER FOR THE 1016

Now you can add VOR/ILS localizer function to the Sapphire 1016 with the Narco VOA-3 converter-indicator. Adaptable also to the Narco Simplexer. Fits any standard instrument cut-out; total weight, including remotely-installed converter unit, 4 pounds. Extreme accuracy and reliability.

See your Narco dealer or write for brochure

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

which manufactures extreme temperature-and-corrosion-resistant hose and hose assemblies, is the first private business to establish a hose fire-test unit that duplicates the equipment used by the CAA Technical Center in Indianapolis, Ind. It is capable of the same type and intensity fire-testing as the government laboratory.

A hose assembly is considered by the CAA to be "fire resistant" if it can withstand the flame for a period of five minutes. It is considered "fire proof" if it withstands the flame test for 15 minutes.

A kerosene torch, mounted in a test tunnel, provides the flame source. It operates with a barrel extension, reflector plates and appropriate choking of the air supply to produce a large area, 2000° F. flame, required by CAA specifications. A photo-electric cell serves as a shut-off device. Enlargement of the flame from the torch, caused by release of flammable fluid from a failing test hose assembly, actuates the photo-electric circuit and automatically registers the "time-to-failure."

It is possible to vibrate the hose assembly under test at any frequency up to 10,000 cycles per minute.

In the control room there are two separate pumping units. A low pressure unit, 100-200 psi, is used for 90 per cent of the testing. A high pressure, 3000 psi, unit is used to test high pressure hose. Both pumping units supply flammable test fluid at temperatures up to temperature conditions of jet engine fuel and oil systems. The types of oil circulated through the hose assemblies under test are MIL-0-5606 hydraulic fluid; Shell Tellus 72, an industrial high temperature hydraulic oil; and Synthetic MIL-L-7808 lubricating. With this new fire test equipment, Resistoflex plans to test a number of products never before checked out under fire conditions.

They plan to make this test facility available to other hose assembly manufacturers for evaluation of their products and to all companies in the aviation field.

Private Weather Facilities Favored by CAA

The CAA is anxious for private weather consulting to gain a strong foothold in the United States. This statement was made by Loren W. Crow, American Meteorological Society, in a talk on "Weather Flying and the Business Aircraft" at the National Business Aircraft Assn.'s convention at Denver, Colo.

Crow said that because of the CAA's limited budget, private services can be a great help. There are 26 private weather consultants in the United States. More than 43 business firms use these facilities.

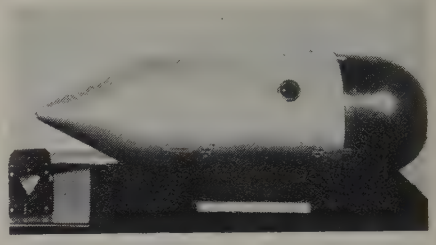
Some reasons in favor of the private aid are that the consultant is limited to his client's needs, and he can give forecasts for any period of time whereas the Weather Bureau is limited to two to five days.

Mel Balzer, United Air Lines, spoke on weather radar and said that UAL can offer business pilots a complete radar course at Denver.

"Dwarf" Radar Mounts In Wing Pod

A simplified, compact and relatively inexpensive weather radar set has been designed for the Air Research and Development Command to reveal paths through squall lines for smaller Air Force aircraft normally not equipped with radar.

The "dwarf" weather avoidance radar, designated the AN/APS-69, weighs less than 70 pounds and, with the exception of the scope, is contained in a *wing pod* measuring only 15½ inches in diameter and 48 inches in length.



STORM DODGER *weather radar designed for smaller Air Force aircraft consists of the scope, left, which is located in the cockpit, and the pod, center, which fits under a wing.*

The development by ARDC's Wright Air Development Center in cooperation with RCA, followed concern over loss of administrative aircraft in storms—aircraft such as the C-45, B-25, T-6 and others which do not carry radar.

Without exact knowledge of a storm center's location that radar gives, such aircraft must detour many miles or land until the storm passes. Deliberate or inadvertent storm penetration is dangerous. The APS-69 provides a radar picture 50 miles ahead of the aircraft and 30 degrees to each side. A squall line is made up of a series of storm centers with relatively calm passages between them. Limited though the radar set is, it enables the pilot to find the calm areas and slip through the squall line.

With the exception of the indicator (scope and housing), all of the APS-69 is contained in the wing-mounted pod. This includes the scanner, receiver-transmitter and auxiliary equipment. Using bomb shackles, the pod can be quickly installed on any aircraft at little expense. The three-inch indicator is mounted at the pilot's position.

The pilot has three switches, so simple is the set to operate. One each to turn the set on or off, to determine sensitivity and to determine range.

A pilot detecting a storm cloud on his scope can depress the switch to give low sensitivity. Only turbulent clouds will be reflected on this setting. If the clouds disappear, the pilot knows he can fly through the area safely.

In negotiating a passage through two

storm clouds, the pilot can depress his range switch, normally at 50 miles, when he approaches to within 10 miles of the formations. With this "close up" photograph of the path ahead, he can more readily pick a safe path through the storms.

More on VHF Antennas

"The use of multi-channel wide band communications equipment on Piper Apache aircraft has yielded a problem heretofore not experienced. Most technicians are readily cognizant of the fact that the radiation "pattern" on any aircraft is extremely irregular, and will change significantly as frequency is changed.

"Skyways Incorporated of Vandalia, Ohio, has gleaned considerable experience in Sapphire 1016 antenna location. It was observed that the location of an antenna with multi-channel communications equipment installed at a point on the top of the fuselage directly over the baggage department yields some very deep nulls, which in some circumstances virtually voids the utility of the equipment at certain frequencies. On the other hand, Skyways reports that the location of the antenna immediately over the cockpit, as far forward as it is practical to place the antenna, and just far enough to one side to avoid the center stringer, virtually negates all of the voids and provides for good equipment performance.

"We suggest that antenna location be of prime consideration when making Apache multichannel equipment installation." NARCO BULLETIN

DME Service Still Available

Results of a recent DME Service Questionnaire by Narco indicate the following authorized DME Service Agencies are ready, willing and able to accept DME Service work at any time:

Associated Radio Co., 3508 Love Field Drive, Dallas, Texas; Atlantic Aviation Corp., Teterboro Air Terminal, Teterboro, N. J.; Bayaire Avionics, Inc., Oakland Municipal Airport, Oakland, Cal.; Bohling Aircraft Corp., Midway Airport, Chicago, Ill.; L. B. Smith Aircraft Corp., P.O. Box 456, Miami 48, Fla.; Matthews Electronics, Municipal Airport, San Antonio, Texas; Minnesota Airmotive, Inc., Wold Chamberlain Airport, Minneapolis 23, Minn.; Piedmont Aviation Inc., Smith Reynolds Airport, Winston-Salem, N.C.; Qualitron, Inc., Lockheed Air Terminal, Burbank, Cal.; Reading Aviation Service, Inc., Municipal Airport, Reading, Pa.; Usher Aviation, Inc., Radio Div. Municipal Airport, New Haven, Conn.

In addition to the above, the following are available for DME service on a limited basis, or by appointment: Aerotron Radio Sales, Box 8442, Hangar 12, Municipal Airport, Tulsa, Okla.; Airborne Communications Inc., Lunken Airport, Cincinnati, Ohio.; Anderson Aircraft Radio Co., Detroit City Airport, Detroit, Michigan; Aviation Radio Co., 9305 W. Appleton Ave., Milwaukee, Wisconsin.

SAFETY DIGEST

RICHARD W. GROUX, *Assistant to Executive Director NBAA*

Compiled and edited from leading air safety publications issued by military, naval, airline, government agencies and from private and business pilots' experiences.

Detector Wards Off Mid-Air Collisions 360 Degree Mirror in the Sky

A device for detecting airplanes in close proximity to each other in the air has been developed by the Avionics Division of Aerojet-General Corp. It is an infrared Proximity Warning Indicator (PWI) and detects the infrared energy (heat) given off by the engines of approaching planes.

It is said that the PWI will give each pilot of the other plane three and a half minutes warning prior to any possible collision.

A unique scanning system in the PWI continuously sweeps 360 degrees of sky.

The system consists of a dome which protrudes from the aircraft and contains a rotating mirror. The unit receives information of an approaching aircraft the instant the mirror is turned toward the oncoming aircraft.

An indicator mounted in the cockpit processes this information on an infrared sensitive photo conductor cell and an electronics "package." Weight of the compact PWI is approximately 30 pounds.

Explosive Electrostatic Discharges

Within a two-week period this spring three MATS transports experienced severe electrostatic discharges under the same approximate conditions of altitude, location and weather. These inflight mishaps occurred at 7,000 or 8,000 feet, 50 miles from Tokyo on the Wake Island route under continuous, or nearly continuous, instrument flight weather. They involved a C-54 on 15 March, A C-97 on 28 March and, 20 hours later, a C-124.

All mishaps took place at the time when the aircraft were just emerging from rain or cloud areas at altitudes where the air temperature ran around —4° C. The aircraft were thought to be proceeding from an area of strong negative charge—in which they themselves had picked up a negative charge in an area of contrasting charge and explosive arcing through the radomes resulted.

This particular situation, they explained, is conducive to the mishaps because: As raindrops get tossed up and down in convective cells, each big drop is eventually fissured, or broken. When this break-up takes place in a thin sheet of the atmosphere, the lower part of which is below freezing and the upper part around —11° C, according to wind tunnel experiments, one of the two fissured drops contains all the negative charge of the original drop and the other, all the positive charge. Then, eventually, the drops with the positive charge get segregated into the upper part of the cloud and the drops with the negative charge get segregated into the lower part.

Therefore, an aircraft flying through such a convective type rain cloud at a level with a predominant charge, may emerge as a well-energized "lightning bug." If the immediately oncoming atmosphere offers a sufficiently strong contrasting electric field this "lightning bug" may not have time to merely glow off its rapidly and recently acquired static radome charge as St. Elmo's fire; instead, it avails itself of the nose-mounted radar antenna for explosively arcing off its big charge to the onrushing new atmospheric electric field ahead.

The effectiveness of the normal plastic and cotton static dischargers appeared to be passable, but they were not in best condition. One of the aircraft had telltale corona-burnt holes along the trailing edges, the other did not. It is thought possible that both aircraft could have acquired, quite suddenly, an intense and localized electrostatic charge, not carried away by the conventional discharges, causing precipitation static or holes in the trailing edges of the wings and other normal areas.

Also, since the large, modernized C-97 and C-124 have a number of isolated metal objects insulated away from the rest of skin, plus plastic areas, these aircraft are not nearly as effective Faraday cages (grounded metallic screens offering protection from electrostatic charges) as earlier aircraft.

For example, the large radomes are not bonded to the aircraft structure. The nose section and radar antenna assembly with its sharp features, in a sense, may act as the aircraft's electrode for probing the oncoming, but as

yet electrically unknown, environment into which it is moving. Rather than discharge "backwards" then through its static lines into an environment already having been electrically experienced and found too weak, an unstably charged aircraft would be more incited by a possibly more intense atmospheric electrical field ahead, discharging forward through its handily available radar-electrode.

Recently, electrically more lethal features have been engineered into the aircraft's self-appointed electrode. The radome pressure bulkhead has been layered and covered with a large glued-on rubber gasket which could perhaps act effectively as a huge electrical condenser for this radar electrode, increasing its capacitance and delaying its discharge until a strong potential has been acquired, insuring an explosive discharge. By a tech order requirement, moreover, some radar antennas in C-97's have been relocated backwards about three inches. The increased distance between the radome and antenna may possibly have affected the arcing potential between them, also favoring more explosive discharges.

Explanation for the fact that this recent series of mishaps followed years, apparently, in which no such aircraft static discharges were reported by aircraft flying in this area is offered as follows:

From climatological considerations, this current season has been very locally abnormal in several respects. The migrating polar airmasses have been very dry and highly polluted. For the first three months of this year the precipitation in Tokyo, for example, was five inches below normal. And, as explained above, recent engineering changes and modifications in the aircraft may have also partly aggravated a natural liability, from time to time, to static discharges. Finally, it should be remembered that "weather" occurs in regimes, each in itself somewhat a periodic in which a series of unusual weather events may happen in quick succession.—THE MATS FLYER.

Altimetry Tips We Forget

And because we forget we have devised some rules. For example: Thirty days has September . . .; East is least and West is best. . .

The one commonly used in altimetry is: When flying into an area of lower pressure or lower temperature the aircraft will be lower than indicated. Conversely, when flying into an area of higher pressure or temperature the aircraft will be higher than indicated.

This article is devoted to "height" altimetry. Before getting into a discussion of height altimetry let's erase a common misconception. Density altitude is NOT associated with computing the height of an aircraft. It is merely the height in a standard atmosphere where the density of the air at some designated point under existing atmospheric conditions corresponds to the density in a standard atmosphere. It is a way of expressing the effect of the actual air density on the true air speed, brake horsepower and lift characteristics of an aircraft. Hence, it is used in performance computations. It DOES NOT correspond to either the pressure altitude of the aircraft (which depends only on pressure) or the true altitude of the aircraft (which depends upon the pressure of the air at flight level, and at sea level, and the mean temperature of the column of air below the aircraft).

Now, having briefly discussed density altitude we are ready to discard it and get into "height" altimetry.

Height altimetry and the reference points of importance to the pilot are:
True altitude—the height above sea level.
Absolute altitude—the height above terrain.
Pressure altitude—the height above the standard datum plane.

In figuring any of the above three types of altitude, scale error corrections should be made. These corrections are normally noted on a correction card located in the cockpit near the altimeter.

To "fly safe" we must also know something of the relationship between pressure altitude, mean temperature and "D" factors ("D" value or simply "D").

Pressure altitude is the altitude read

on the face of the standard altimeter when 29.92 is set in the Kollsman window. It is the vertical distance above sea level in a standard atmosphere at which a given pressure is to be found.

Mean temperature, insofar as altimetry is concerned, is the average temperature of a column of air.

"D," as expressed by the equation D=Z—Zp, is the difference between the true altitude of the aircraft and the indicated pressure altitude. (D values can be obtained from the forecaster either during preflight briefing, or by a radio call in flight.)

When "D" is considered at the surface of the ground it is used as (converted to) an altimeter correction or altimeter setting. When this converted D value is set on the altimeter (Kollsman window) the altimeter indicates true altitude within the limits of instrumentation at the surface of the ground. However, D values for various heights in the air column will usually be different since D is dependent upon the temperature variation with height throughout the air column. By using upper air soundings which indicate variation in atmospheric conditions from the standard, D (either observed or forecast) can be used in flight operations to obtain true altitude over a specific location by the following recommended methods:

1. Algebraically add D to the indicated pressure altitude reading (altimeter setting of 29.92) to obtain true altitude.

Example: Indicated Pressure Altitude

$$\begin{aligned} D = & \quad 10{,}000 \text{ ft.} \\ & + 1{,}000 \\ \text{True Altitude} = & \quad 11{,}000 \text{ ft.} \end{aligned}$$

2. If it is desired to have the altimeter read true altitude (within the limits of instrumentation) convert the D value for the desired flight level to an altimeter setting using the following formula:

$$\text{Altimeter Setting} = 29.92 + \frac{D}{925}$$

Example: $D = -925$

$$-925$$

$$\text{Then } 29.92 + \frac{\quad}{925} = 28.92$$

3. In order to determine the difference between true and calibrated altitude with the local altimeter setting on the Kollsman dial, add the altimeter setting correction factor 925 (29.92 minus local altimeter settings) algebraically to the D value. If the result is negative the aircraft is lower than indicated. If positive the converse is true.

NAtional 8-0804

NATIONAL BUSINESS AIRCRAFT ASSOCIATION, INC.

344 PENNSYLVANIA BUILDING, WASHINGTON 4, D. C.

APPLICATION FOR MEMBERSHIP

(Please Fill Out Completely)

Name of Applicant _____

Address _____
Number and Street *City* *Zone* *State*

President's Name _____ Business Address _____

Corporation _____ Company _____ Partnership _____ Institution _____ Individual _____

Nature of Applicant's Business _____

Percentage of business derived from the aviation industry (if applicable) _____ %

Owned and/or operated aircraft as adjunct to business since _____

Company executive to receive all notices and correspondence from our Association:

Name _____ Title _____

Address _____ Telephone _____
Number and Street

_____
City *Zone* *State*

Executive in charge of aviation activities:

Name _____ Title _____ Business Address _____

Chief Pilot's Name _____

Preferred Mailing Address _____
Number & Street *City* *Zone* *State*

I/We hereby apply for membership in the NBAA in the classification checked . . . . . .

REGULAR

( ) $100.00 - One single engine aircraft
( ) $125.00 - Two single engine aircraft
( ) $150.00 - One multiengine and not more than two single engine aircraft
( ) $200.00 - Two multiengine and any number of single engine aircraft
( ) $250.00 - Three or more multiengine and any number of single engine aircraft

ASSOCIATE

( ) $150.00 - All applicants primarily engaged in aviation or air transportation field

or

( ) $150.00 - All applicants owning or operating aircraft for business purposes who do not employ a professional pilot, i.e., pilot with commercial certificate and instrument rating.

Enclosed is my/our check in the amount of $_____ to cover annual dues in the membership classification checked above. It is understood that membership becomes effective on date of acceptance of application by the Board of Directors of the NBAA.

_____
Authorized Signature of Company Official

_____ _____
Date *Title*

NOTE *(Please complete Pilot and Aircraft Data on other side)*

✓ Check where indicated	*	✓	✓	Instrument Rating ✓			Instructor Rating ✓			Total Hours Actually Flown					
PILOT'S NAME	Title	ATR	Com.	CAA	Green	White	Flt.	Instr't	Ground	Day	Night	Instr't	X-Country	Civil	Milita

TYPE OF AIRCRAFT (Mfg. & Model)	REGISTRATION NUMBER	✓ SEL	✓ MEL		✓ SES	✓ MES		Average Hrs. Flown Per Month	✓ Do You Fly On Instruments?		Home Airport
			2	4		2	4		Day	Night	

* Designation as—CP (Chief Pilot); P (Pilot); CoP (CoPilot); CoP/M (CoPilot/Mechanic)

✓ Check as indicated. SEL—Single Engine, Land SES—Single Engine, Sea
MEL—Multiengine, Land MES—Multiengine, Sea

Example: D = −425
Local Altimeter Setting 28.92
Then 925 (29.92-28.92) = 925
925 + (− 425) = 500
Aircraft is 500 feet higher than indicated.

Methods of obtaining true altitude, in order of accuracy, are:
1. Absolute radar altimeter
2. D values from upper air weather soundings.
3. Circular Computer—using pressure alt (29.92) and free air temperature at flight level as factors.

NOTE:
The 925 correction factor used in this article is from the Smithsonian Meteorological Tables. The Smithsonian Tables, as do upper air sounding charts, take into account the non-linear lapse rate.

Failure to correct for non-standard pressure and temperature conditions, particularly in the vicinity of Mountainous terrain and arctic regions, and to recognize that the temperature lapse rate is non-linear can result in extreme and hazardous altimetry errors.—THE MATS FLYER.

Takeoff Performance

By Capt. Marion R. Anderson—USAF

Takeoff performance is frequently one of the most critical considerations in planning a mission. It is the takeoff which limits the load that can be carried, for an aircraft can fly a considerably greater load than it can handle during takeoff. Because of wide variations in atmospheric conditions, and of pilot technique, and since power available is subject to variation, it is not a simple matter to predict takeoff performance accurately.

Takeoff procedures are more or less standard. In initial stages of the takeoff roll, weight is usually on the nose gear until the airspeed approaches the recommended takeoff speed. By easing the weight off the nose gear and increasing the angle of attack, the airplane is allowed to fly itself off the runway. With a given flap setting the takeoff IAS is dependent only on the gross weight of the aircraft.

The major factors that affect the distance required to accelerate an aircraft from a standstill to the takeoff speed are rolling friction, aerodynamic drag, inertia of the aircraft, and the thrust of the engines. Secondary factors are atmospheric conditions, wind and runway slope.

During the takeoff run the forces on an aircraft are in a state of unbalance of these forces. The forces on an aircraft can be expressed as follows:

Total Thrust = rolling friction drag + aerodynamic drag + accelerating force. Rolling resistance is equal to the weight on the wheels multiplied by the coefficient of rolling friction. When the aircraft is not moving the weight on the wheels is equal to the weight of the aircraft. As the aircraft accelerates the weight on the wheels decreases as the wings gain lift. At takeoff the wings have assumed all the weight and the weight on the wheels has dropped to zero.

Aerodynamic drag will increase in airspeed according to the formula:

$$D = C_D S \frac{EAS^2}{391}$$

C_D = Coefficient of drag, depends on the attitude of the aircraft.
S = The area of the wing.
EAS = Equivalent airspeed.
391 = A constant.

From the formula it can be seen that the drag increases with the square of the airspeed. For example, at 80 MPH the drag is four times greater than at 40 MPH.

The force accelerating an aircraft is what is left of the total thrust output of the engines after rolling friction and aerodynamic drag have been subtracted as illustrated below.

The acceleration of an aircraft is dependent upon the weight of the aircraft and the accelerating force or excess thrust. The formula that expresses this relationship has been around quite a few years. It states that the force required to accelerate an object is the product of its mass multiplied by the acceleration, or F = Ma. A resulting acceleration from a given object and force then would be the mass of the object divided by the accelerating force or a = M/F. The force referred to here is the force of inertia of the aircraft. The greater the force of inertia, the greater the acceleration resulting in shorter takeoff distances.

The thrust output of a reciprocating

type engine is affected primarily by the pressure altitude, the carburetor air temperature, the humidity in the air and the mechanical condition of the engine. Generally as pressure altitude increases the power output of an engine decreases. As temperature of the air passing into the cylinders increases the power decreases. As the water vapor in the air increases it displaces part of the air passing into the cylinders, decreasing the quantity of oxygen in the air charge and causing a loss of power. Naturally, an engine in poor mechanical condition will not put out the power expected of one in good condition.

In summary it can be said that losses in power or thrust, regardless of the cause or combination of causes will increase a takeoff distance. This is caused by a reduction of the excess thrust, the cream of the takeoff power.

During the hot summer months, aircraft takeoff performance is most critical. Prior to takeoff, don't leave any part of the problem unfigured. And if, in your computations, you come across any variable or doubtful factor, figure on the SAFE side.—MATS FLYER.

Air Crew Utilization on Long Flights

By E. T. House

British Legislative Restriction of Aircrew Working Time

The United Kingdom proposals, at present, seek to restrict length of the working day according to the number of pilots and/or engineers on board and then to relate certain minimum rest periods to such working days. The view of the British Ministry of Transport and Civil Aviation is, apparently, that fatigue is induced in a man when he is on duty, whether or not he is flying, and that the longer his period of duty, the greater his state of fatigue and therefore the longer must be his following rest period.

The real problem in introducing legislation on this subject is the difficulty in defining fatigue from either clinical or other standards. That is to say, it is impossible at present to define, with any degree of accuracy, that stage in a man's physical or mental condition when it can be said that, because he is in need of rest, he is no longer in a state that will permit him to continue his work on an aircraft with safety. Furthermore, this state varies in different people after the same experience, and varies in the same people according to their environment and physical or mental condition. Crew fatigue can be reduced very directly by improving the environment, for example by using better navigational aids or less instruments or by reducing noise and vibration. For this reason, legislation related to duty time that might be perfectly reasonable when issued, can be severely restrictive or unreasonable a year or two later.

Cockpit Load

Final consideration must be concerned with what is becoming known as the 'cockpit load.' This term is related to the need for a particular number of men to be on duty in an aircraft at the time when the maximum work load occurs. Speed, design and flight operational procedures are the main criteria and innumerable factors associated with these subjects all have their effect. In some types of aircraft, the cockpit load can be very high continuously through the flight. For example on jet aircraft the load is high simply because the speed reduces the time, not only in which work can be done, but also in which vital decisions have to be made.

The future, with turbo-jet aircraft, reduces the likelihood of the three-pilot crew. There is little doubt that, with cruising speeds of 500 to 580 mph, the two-pilot duty day, with whatever ancillary crew may be decided, will be long enough to satisfy most operators. In the case of the very big jets, two six hour stages will then give an aircraft a duty range of some 5,000 to 6,000 miles and although this will undoubtedly result in comparatively low utilization of crew flying hours, the operational application should be very satisfactory, as also will be the output of capacity ton miles per crew member.—SHELL AVIATION NEWS.

(Continued on page 50)

HELIO — SHORT TAKEOFF, LANDING

The STOL, short takeoff and landing, airplane has been the aim of manufacturers for years. Here is a plane that is not in the wishful thinking stage.

The "STOL" airplane with safety as a basic feature is the Helio Courier. This four place light plane is flying its way into the business aircraft field with its ability to take off and land fully loaded in less than 75 yards.

In nearly three years of operation there has never been a passenger injury in a certificated Courier.

Known for its Short Takeoff and Landing (STOL) ability, the Courier reportedly can cruise at more than 160 mph as well as at ultra-low speeds.

Lynn L. Bollinger, Helio president, recently made a survey of aircraft needs in Latin American countries. "Despite severe currency problems in some of the countries," he said, "there is a general feeling of progress and expansion" including the growth of air transportation.

Mining companies, government agencies, oil companies and private owners of Couriers are helping to open the vast interior areas, heretofore barely explored, Bollinger said.

Jungle Aircraft and Radio Service, operators of a non-profit aviation service into jungle areas of Peru, Bolivia and Ecuador, was first to utilize the Courier in undeveloped areas. Originally set up to transport missionaries and students, the service is now used also by government representatives, explorers, engineers and others having business in the interior. The Jungle airline is gradually replacing its present fleet of 14 airplanes with Couriers. It has four now.

As part of his tour, Bollinger flew to one of the most isolated points of civilization in South America . . . a jungle airstrip some 450 miles north east of Lima, Peru.

The 525 foot-long-runway at an elevation of 3,000 feet is visited weekly by a Courier bringing letters and supplies for missionaries working with tribes in the area.

The only other means of transportation to the site takes one-and-a-half months by canoe from Pucallpa, last jungle town on the Ucayali River, a tributary of the Amazon.

The Peruvian Ministry of War is one of six governmental agencies to own Couriers. Others include the U. S. Border Patrol and governmental bureaus in Canada, Brazil, Mexico and Venezuela.

Company user-owners of the Courier have offices from coast to coast and border to south of the border. Firms include the Union Carbide Nuclear Co. of Grand Junction, Colorado; Island Creek Coal Co. of Huntington, West Virginia; International Research and Development Corporation of Columbus, Ohio; Western Newspaper Union, New York City; Bostwick Prospecting Co., of Shelburne, Vermont.

Holland Furnace Co. of Holland, Michigan; Bender Oil Operations of Bakersfield, California; Paradynamics Inc., of St. Louis, Missouri; Rounds and Porter Lumber Co. of Wichita, Kansas; Stein Lumber Co. of Sacramento, California; Southern Peru of American Smelting and Refining Corp.; and Petroleum Helicopters Inc. flying for Gulf Oil in Bolivia.

The plane can be operated interchangeably on wheels or floats. Performance data include:

Takeoff and landing in no wind with four occupants is 75 yards; over a 50-foot obstacle, 165 yards;

Range with 60 gallons, the fuel capacity, is over 700 miles;

Useful load at 3,000 lbs. design gross (CAR 03) is 1120 lbs.; with cargo and crew only (CAR 08), 1620 lbs.;

Service ceiling with compensated carburetor is over 23,000 feet;

Power plant is a 260 hp. geared Lycoming;

Wing span is 39 feet; length, 29 feet; height, eight feet, 10 inches.

The power off rate of descent is less than that of a parachute.

Another use for the plane is for agricultural flying. The plane can be equipped for crop dusting and spraying.

Otto C. Koppen, professor in charge of aircraft design at Massachusetts Institute of Technology, designed and flew the first successful "helioplane" prototype more than six years ago.

Helio Aircraft Corporation is located at Norwood, Massachusetts.

. . . . in the business hangar

■ **Horton and Horton,** Fort Worth, redecorated Forest Oil Corp.'s D-18 with off-white grasscloth vinyl leather headlining; ice-green and cocoa-biege seats; custom-dyed green carpet with built-in sponge underlay; "Super Sky Hamper" toilet in lieu of fifth seat; green "bubble" type double windows. Kenneth Buis flew the plane to Houston. ☐ Mrs. H. W. Morrison of Morrison Knudsen, Boise, Idaho, chose pearl grey gabardine headlining; grey plexiglas translucent Formica for bulkheads, cabinets and conference tables; hand print rose, grey and gold draperies for her DC-3. George Oswald and Steve Sandmeyer supervised installation of Madsen High Intensity Strobe Anti-Collision Lights. ☐ Life and Casualty's Lodestar (Nashville, Tenn.) was spruced up with new seat upholstery, forward area rework, complete shampooing autumn walnut Formica conference tables and modern print draperies. Pilots are Robert Stone and George Shotwell.

Danish brass door handles, plastic forward bulkhead and door with imbedded semi-precious stones, club-size swivel seats, oriental influence sliding black anodized cloak room doors, white and gold Formica lavatory, gold anodized perforated aluminum sidewalls, hand-woven carpeting with two-inch foam underlay are a few highlights of the radical, beautiful Lodestar interior done for NBAA member Burnett Estates and Windfohr, Fort Worth. Charles Baudoux pilots the Fort Worth-based plane.

■ **Remmert Werner, Inc.,** St. Louis, Mo., completed an engine change for Super Service Motor Freight's D18S brought in by Robert Veller. ☐ Monsanto Chemical Co. had a set of Remmert Werner lightweight landing gear doors installed on one of the DC-3s. Ralph Piper is chief pilot. ☐ A transistorized auto-pilot was installed in General Insuror's Aero Commander. Walter Westerfield is the pilot. ☐ Green Construction Co. had a double engine change on their twin-Bonanza for which Paul Duncan is chief pilot. ☐ DC-3 for Trans-Canada Pipeline Co., Toronto, Canada. Conversion included complete instrumentation and interior decoration. Tom Griffiths is chief pilot. ☐ Robert Veller brought the Super Service Motor Freight D18S to Remmert-Werner in St. Louis for an engine change. ☐ Monsanto Chemical Company had a set of Remmert-Werner lightweight landing gear doors installed on one of their DC-3s by Remmert-Werner in St. Louis. Ralph Piper is Chief Pilot. ☐ Walter Westerfield, pilot for General Insuror's Aero Commander is having a transistorized auto-pilot installed by Remmert-Werner in St. Louis. ☐ Green Construction Company brought their twin Bonanza to Remmert-Werner Inc. in St. Louis for a double engine change. Paul Duncan is Chief Pilot.

■ **Garrett Corp.'s AiResearch** Aviation Service Div., Los Angeles Internat'l Airport, working on Schenley Industries' DC-3 brought in by A. I. Rahm for 100 hour inspection. ☐ Martin Co., Baltimore, Md., 440 back in service with wing tanks, new interior, other work. ☐ Ladish Co., Cudahy, Wisc., DC-3 received 100-hour inspection, deicer boots and Maximizer installation. ☐ Oliver E. Field's D18S receiving new exterior paint job and miscellaneous work. C. E. Clark is pilot.

■ **Airmar Radio Service,** Inc., Ronkonkoma, L.I., N.Y., installed a complete radio system in the Grumman Mallard owned by J. J. Ryan. C. W. Bing is company pilot. ☐ Douglas DC-3 owned by Mrs. Sarah Mellon Scaife was in for a Sperry Integrated Instrument System installation plus other instruments. J. E. Leonard is the pilot. ☐ **Fuller Brush Co.'s** Grumman Mallard had new radio system installed. Pilot is R. E. Parrott. ☐ Esso Shipping Co. had new radio system installed in their Grumman Mallard which is piloted by Jack Trunk. ☐ Lanolin Plus, Inc., had new radio systems installed in their Grumman Goose which is piloted by Bill Hunt.

■ **Executive Aircraft Service, Inc.,** Dallas, Tex., changed an engine and made other modifications on Dow Chemical's DC-3. Russell Purchase is chief pilot for the Midland, Tex., firm. ☐ Atlantic Refining Co., Dallas, Tex., had a 100-hour inspection of their DC-3 of which Herb Hansen is chief pilot. ☐ S. W. Richardson, Fort Worth, Tex., had a double engine change on a DC-3 plus 100-hour inspection and other repairs. Pilot is Jim Smith. ☐ Creole Petroleum Corp., Caracas, Venezuela, had a double engine change, airframe overhaul, radome and other installations made on their DC-3. Pilot is Steve Grant; flight engineer is Hank Steinhauser. ☐ Reynolds Metals Co. DC-3 was flown in by pilot Charlie Johnson for a variety of modifications and repairs.

Aircraft Distributors and Manufacturers to Meet

Aviation Distributors and Manufacturers Association meets November 21 and 22 at the Sheraton-Cadillac Hotel, Detroit, Mich.

The two-day business meeting will have on the program Ira O. Goodnight of the Electric Auto Lite Co. speaking on, Budgeting for Profit; and Phyllis Brown of E. Tilson Peabody, General Motors Corporation, speaking on, The Salesman's Wife.

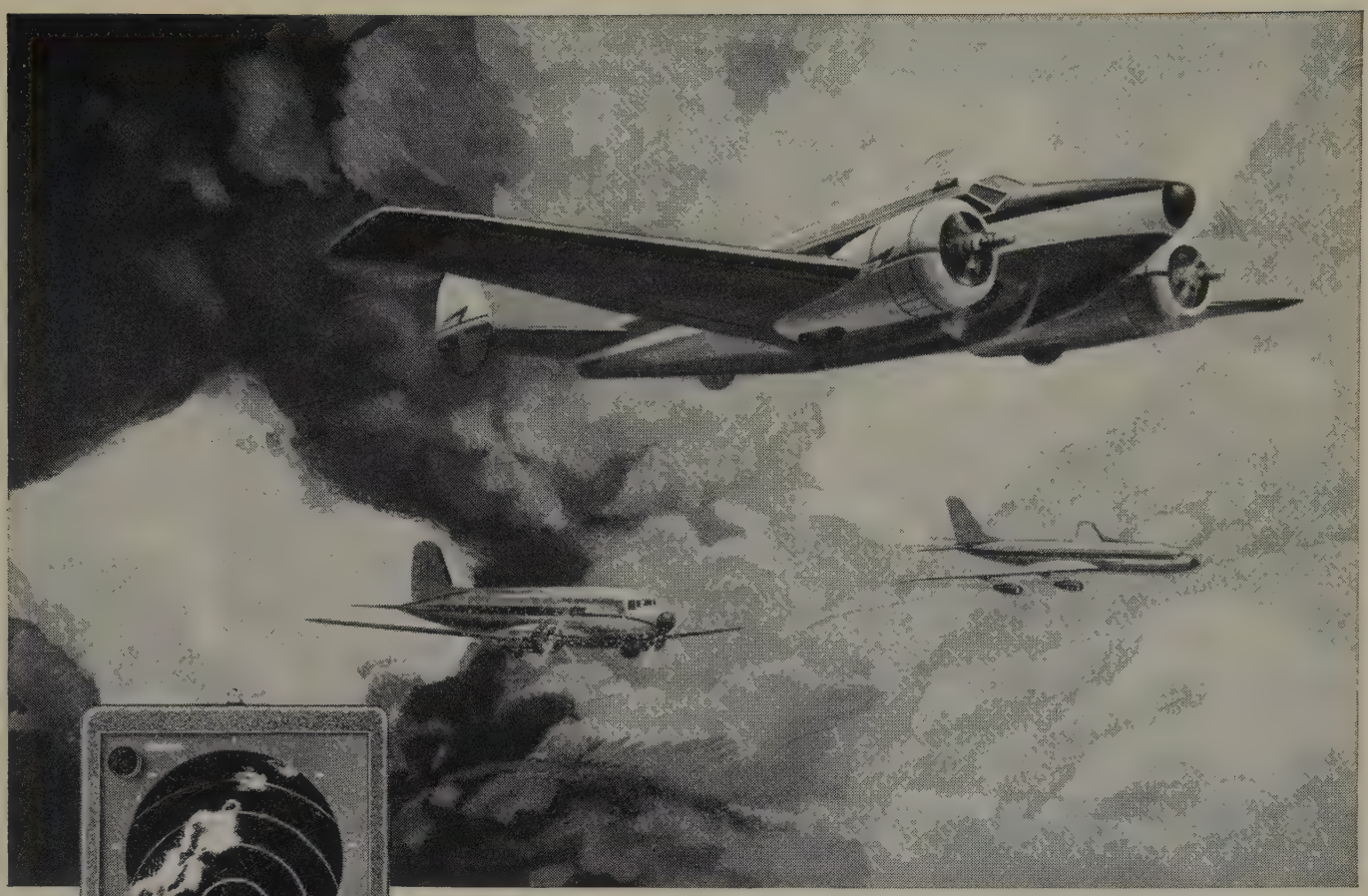
ADMA president is Jack Moore, Headquarters are at 1900 Arch St., Philadelphia, Pa.

Improved Flight Characteristics Claimed for Light Planes

The use of an oleo rubber-shock absorbing system built into wing lift struts improves flight performance of light planes, claims designer Earl G. Metzler of Latrobe, Pa.

Metzler's device, "Wings with Springs," was given CAA Supplemental Type Certificate SA1-95 after a successful Taylorcraft demonstration flight.

The shock absorber device has a variable dihedral effect which designer-builder Metzler claims gives the plane improved flight characteristics in rough and smooth air.



This is a typical storm as it appears on pilot's indicator. The dark holes indicate areas of high turbulence. Thus warned, pilot can select a safe, comfortable flight path through or around storm area.

FIRST "150-MILE" WEATHER RADAR THAT FITS ALL THREE!

There's a big difference in the size of the aircraft shown above. There's a big difference, too, in the jobs they are required to perform. But one thing they do share in common—an ability to fly safely and smoothly either through or around storm fronts or other dangerous weather conditions. For all three are equipped with the new Bendix* RDR-1D Airborne Weather Radar System.

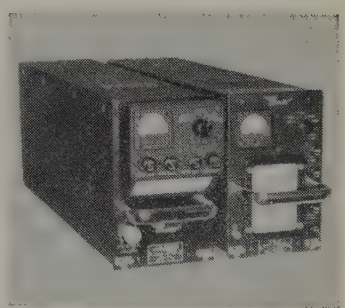
Substantial weight and size reductions, without impairment of quality or performance, now enable Bendix to offer this 150-mile-range, airline type weather radar equipment to a much wider variety of business and commercial aircraft.

Performance equals that of present commercial weather radar systems requiring twice the amount of electronic rack space. Total system weight is now approximately 85 pounds. For aircraft lacking sufficient space for the larger 22- and 30-inch "dish" antennas, new 15- and 18-inch sector scanning antennas will be available.

What's more, the new components are interchangeable with Bendix' famed, time-tested veteran of the global airways, the RDR-1B X-Band System. In addition to its primary function, this new RDR-1D system matches its famous counterpart for ground mapping and terrain avoidance.

For complete information, write to Bendix Radio, Aviation Electronic Products, Baltimore 4, Maryland. Or West Coast—10500 Magnolia Blvd., N. Hollywood, Calif.; Export—Bendix International Division, 205 E. 42nd St., N. Y. 17, N. Y. Canada—Computing Devices of Canada Limited, P. O. Box 508, Ottawa 5, Ont.

*REG. U.S. PAT. OFF.



RDR-1D Transmitter-Receiver
SYN-1B Synchronizer-Power Supply

New RDR-1D Transmitter-Receiver weighs only 26 pounds . . . Synchronizer-Power Supply only 21 pounds. Total rack space for complete system is only 1-ATR.

Bendix Radio Division
BALTIMORE 4, MARYLAND

Bendix
AVIATION CORPORATION

The Shape of Things — Medically

By Russel J. Vastine Jr., M. D.
Aviation Medicine

Questionnaires submitted by the Flying Physicians Association to business aircraft owners in six states received a 24% return. What are your answers to the questions below? Doing all you can?

In May, 1957, a preliminary study on the status of medical care of flying personnel was undertaken by the Flying Physicians Association. This was accomplished by means of a questionaire consisting of 15 questions mailed to 1783 businesses, large and small, that had listed their aircraft as being used in their businesses. These businesses were located in the states of Ohio, Indiana, Michigan, Illinois, Wisconsin and Kentucky. We received 429 usable returns comprising 24% of the total.

Our purpose in conducting this study was to obtain information regarding the type of flying done, the type of medical care maintained for hiring and maintaining flying personnel and the feeling that these people had concerning the adequacy of their programs. The results given below were most revealing.

1. HOW MANY PILOTS DO YOU EMPLOY? 232 answered that they employed one pilot. This includes those who fly their own airplanes and those who employ only one pilot. 157 employed two to five pilots. 16 employed six to ten pilots. Eight employed 11 to 30 and two employed 31 or more. The greatest number of pilots employed by one corporation was 48. Two did not answer.

2. HOW MANY HOURS PER MONTH DOES EACH FLY? 66 answered ten or less. 91 answered 11 to 20 hours. 79 answered 21 to 30 hours. 42 answered 31 to 40 hours. 58 answered 41 to 50 hours. 51 answered 51 to 80 hours. 7 answered 81 to 100. Three answered 101 or more. 32 did not answer.

3. DO YOUR EXECUTIVES AND KEY PERSONNEL FLY AIRPLANES? Yes—281. No—146. No answer—2.

4. DO YOU HAVE SAFETY MINIMUMS ESTABLISHED FOR TAKE-OFF IN WEATHER? Yes—360. No—62. No answer—9.

5. WHAT RATINGS DO YOU REQUIRE YOUR PILOTS TO HAVE? Private — 180; commercial — 171; A.T.R.—66; no answer—12.

6. DO YOU HAVE ANY MEDICAL STANDARDS FOR HIRING AND MAINTAINING PERSONNEL? Yes—215; no—163; no answer—51. Most of those answering "yes" used only the ability to pass the required C.A.A. physical.

7. WHAT AMOUNT DO YOU SPEND PER PILOT PER YEAR FOR MEDICAL CARE? 112 answered nothing; 18 spent $10 or less; 21, $11 to $25; 19, $26 to $50; 17, $51 to $100; 9, $101 or more. 233 did not answer. The highest amount listed was $1000. but this may have been a mistake in the use of the decimal. The next highest was $250. Those companies with Medical Directors did not have breakdowns of the cost of medical care for pilots.

8. DO YOU HAVE REFRESHER COURSES FOR YOUR PILOTS? Yes—175; no—244; no answer—30.

9. WHAT FACILITIES DO YOU USE FOR EXAMINATION OF YOUR PILOTS? Private Physician—143; Aviation Medicine Specialist—22; Medical Director—15; C.A.A. Examiner—232; no answer—17.

10. HOW OFTEN ARE YOUR PILOTS EXAMINED? 6 months—86; 1 year—231; two years—105; no answer—7.

11. HAVE YOU ESTABLISHED ANY RULES FOR WHOM IN YOUR ORGANIZATION MAY FLY AS PASSENGERS? Yes—134; no—271; no answer—21.

12. WHO CONTROLS THE FLIGHT OF YOUR PLANES AS TO WEATHER FLYING? Executive—5; pilot—415; no answer—9.

13. DO YOU OFFER YOUR EXECUTIVES ROUTINE PHYSICAL EXAMS? Yes—158; no—227; no answer—44. IF SO, HOW OFTEN? 6 months—10; 1 year—123; 2 years—20; no answer—5.

14. DO YOU FEEL YOUR PROGRAM IS ADEQUATE FOR THE PROTECTION OF YOUR EXECUTIVES, PILOTS AND AIRPLANE INVESTMENT? Yes—363; no—29; no answer—27.

15. WOULD YOU LIKE MORE ADEQUATE SUPERVISION OF YOUR PROGRAM? Yes—65; no—270; no answer—94.

In compiling the data obtained in this survey, one is impressed with the tremendous lack of interest in the Preventive Medicine aspects of aviation by pilots and their employers. It has been shown by the answers to question six that the requirement for hiring and maintaining personnel in most cases, is merely the holding of a valid C.A.A. Medical Certificate. Admittedly the required examinations of the C.A.A. are screening types. The use of this type of examination as the sole means of hiring and maintaining personnel is not in the realm of good personal health maintenance. One also finds that key personnel are not afforded the opportunity of a company program of annual health surveys. The loss of these people through preventable or curable illness is an expense that few companies can afford. Encouragement in the maintenance of health is of great advantage to management, not only in the realm of the pilot, but also in the realm of the executive.

It is apparent that examinations are required in accord with C.A.A. frequency. It is the opinion, generally, of those most interested in Preventive Medicine that annual examinations offer the greatest yield. More frequent or less frequent examination reduces, rather than increases this yield. Annual examination of the private and corporate pilot would, therefore, seem to be the sensible approach.

The use of refresher courses in the operation and maintenance of aircraft would keep flying personnel abreast of recent changes and enhance the safety of flying. Continued stimulation of interest in any subject increases the ability of the individual so stimulated. This is valid for any vocation.

Pilots must be assured that adequate medical examination and good training courses will not jeopardize their livelihood. The examining physician, the Medical Director of the C.A.A. and the employer must not use the medical examination as a means of dismissal. The relationship between the pilot and the examining physician must not be interfered with by the employer. The use of medical personnel, interested in and aware of the problems of flying, ought to allow the placement of responsibility of deciding the mental and physical fitness of the examinee for flying in the hands of the examining physician. There should be no requirement of grades in any proposed training course. The only requirement for refresher courses should be attendance and attention.

As Doctor J. C. Smith, Deputy Chief of the Medical Division of C.A.A. so aptly put it recently, "Pilots have nothing to fear from good medical examinations, only from poor ones." This applies also to refresher courses.

CAA's Flying Prog.

(Continued from page 25)

some companies could have an aviation division.

Other pilots added that single engine night operation, also, was the only feasible way some companies could justify the existence of an aircraft.

The panel agreed that, in congested areas, two pilots are necessary.

It was also brought out that pilots should not be required to work in the cabin because the operation becomes a single pilot operation.

NBAA Pilot Awards

(Continued from page 24)

4. ***William F. Austin,** Lukens Steel Co., Coatesville, Pa. 681,920
5. ***Ridgway Baker,** Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. 545,655
6. **James M. Banker,** ARMCO Steel Corp., Middletown, Ohio 771,900
7. **Earle W. Bauer,** The Ohio Oil Co., Findlay, Ohio 737,188
8. ***Carl Leo Boyd,** Eastman Kodak Co., Rochester, N. Y. 682,220
9. **Ralph W. Bryson,** Anchor Hocking Glass Corp., Lancaster, Ohio 600,000
10. ***William G. Buckingham,** Sunstrand Machine Tool Co., Rockford, Ill. 571,926
11. ***W. W. Scott Chapman,** Lear, Inc., Grand Rapids, Mich. 838,500
12. ***Kenneth G. Colthorpe,** Champion Spark Plug Co., Toledo, Ohio 541,980
13. ***William C. Correll,** Waterman Steamship Corp., Mobile, Ala. 658,475
14. **Earl O. B. Dahl,** American Can Co., New York, N.Y. 919,520
15. ***Kenneth J. Eldred,** Ford Motor Co., Dearborn, Mich. 509,960
16. ***Carl C. Forrester, Jr.,** E. T. Barwick Mills, Atlanta, Ga. 571,985
17. **James M. Grogan,** Pillsbury Mills, Inc., Minneapolis, Minn. 950,000
18. ***George M. Guthrie,** Southern Natural Gas Co., Birmingham, Ala. 539,973
19. ***James C. Hamilton,** Ford Motor Co., Dearborn, Mich. 614,000
20. ***Calvin C. Hardy,** Southern Natural Gas Co., Birmingham, Ala. 529,201
21. ***Charles E. Hayes,** Champion Paper & Fibre Co., Hamilton, Ohio 635,910
22. ***Robert F. Hinds,** The Chemstrand Corp., Decatur, Ala. 580,825
23. **Armond Hinkle,** Minnesota Mining & Mfg. Co., St. Paul, Minn. 708,300
24. ***G. L. Hobbs,** Beloit Iron Works, Beloit, Wis. 884,000
25. ***J. A. Hopkins,** American Can Co., New York, N. Y. 846,650
26. **Kenneth F. Horton, Jr.,** Sinclair Refining Co., Tulsa, Okla. 828,940
27. ***Donald William Hubbard,** Tobin Map Co., Inc., San Antonio, Texas 630,761
28. **Wilmer A. Ivey,** Southern Natural Gas Co., Birmingham, Ala. 811,989
29. ***Albert L. Jones,** U. S. Steel Corp., New York, N. Y. 607,500
30. **Charles S. Kincaid,** Service Pipeline Co., Tulsa, Okla. 898,244
31. ***Jack L. King,** C. J. Langenfelder & Son, Inc., Baltimore, Md. 586,400
32. **Clayton R. Kinney,** Burlington Industries, Inc., Greensboro, N. C. 713,997
33. ***Carl G. Koeling,** Kearney and Trecker Corp., Milwaukee 7, Wis. 595,000
34. ***John A. Korver,** Ford Motor Co., Dearborn, Mich. 508,500
35. **Joseph L. Lacey,** Sinclair Refining Co., Tulsa, Okla. 780,000
36. ***Arthur Lippa, Jr.,** U. S. Steel Corp., New York, N. Y. 668,395
37. **Melvin C. Lora,** The Ohio Oil Co., Findlay, Ohio 871,765
38. **Glenn C. Lowe,** The Ohio Oil Co., Findlay, Ohio 596,155
39. ***William I. Lucas,** Chrysler Corp., Detroit, Mich. 824,000
40. **John H. Luchow,** The Procter & Gamble Co., Cincinnati, Ohio 532,440
41. ***Joseph M. Lycan,** Texas Eastern Transmission Corp., Shreveport, La. 809,079

(Continued on page 49)

HILLER *12-C belongs to Consolidated Zinc Proprietary, Ltd., of Australia. It is used for "expediting and proving its value for geological exploration" in isolated areas.*

'COPTERS For Business

Hiller Helicopters' plant, some 25 miles south of San Francisco, Calif., sprawls out in modern buildings reflecting the product produced there and the foresight of Stanley Hiller Jr., the firm's young president. This article is indicative of Hiller's world-wide recognition gained in only a few years.

The only helicopter company ever to rely on commercial sales alone for income is Hiller Helicopters of Palo Alto, California.

Ever since the Hiller 360 was certificated by the Civil Aeronautics Administration in October, 1948, Hiller has pioneered rotary wing commercial sales and operations in countries throughout the world and has frequently sold the first helicopter to be seen or operated in far-off lands.

For several years after the Hiller 360 was certificated, sales were on a commercial basis exclusively, but with the advent of the Korean conflict military sales began. Since the Korean conflict both commercial and military models have rolled off the Hiller production line, and both see world-wide service.

Domestically, Hillers have been used by a number of operators throughout the United States in missions ranging from business and executive travel, to traffic and police work and to the miscellaneous charter assignments of fixed-base operators. They have been instrumental on many occasions in pioneering helicopter techniques and utilizations, and have helped repeatedly to inaugurate the first heliport in many urban areas.

Representing such users are the J.D. Reed Co., Houston, Tex.; Philip Armour, Chicago, Ill.; The Norman Larson Co. and International Helicoptors, both of Los Angeles, Calif.; and East Coast Aviation Corp., Lexington, Massachusetts.

In the course of development of helicopter use, a number of operations have been outstanding for their impact on the aviation world concerning either unusual success or fleet applications of rotary wing aircraft.

In Paris, France, Commandant Henry Boris, Helicop-Air president, has been a Hiller distributor since 1949. He has earned the title "Mr. Helicopter" in Europe for his aggressive promotion of all types of rotary wing activities. In addition to sales and service facilities, his company trains pilots and mechanics and coordinates operations for many dealers throughout European countries and their colonies.

The Thailand government has been using a Hiller 360 since 1949 for traffic and law enforcement, border patrol and officials' transportation.

In accomplishing a record of having commercial Hillers operated in more than 60 countries of the world, A.W.B. (Bill) Vincent, vice president, commercial sales, set up a world-wide distributorship system to coordinate sales and service. The current production model is the 12-C which succeeds the 360, produced from 1948 to 1950, and the 12-B.

Saving executive time is the reason the Fastener Corp. of Chicago, Ill., uses a Hiller 12-C. For the same reason, John Mecom of Hitchcock, Tex., uses a 'copter with his oil business.

To speed deliveries from plant to airport is the purpose of the Westinghouse Corp., Pittsburgh, Pa., in operating a Hiller. Of the same city, Industrial Helicopters uses the helicopter for business charters.

Agricultural flying is an important use of the "chopper" in the United States. Recent purchasers abroad . . . Fison Airwork, Ltd., Cambridge England; Sociedad Agricola y Industrial, S.A. Guayaquil, Ecuador; Helicopter Services, Ltd., Hamilton, New Zealand . . . are using the 12-C for agricultural purposes.

Hiller is one helicopter producer whose product is in use for business flying the world over.

OIL RIG *inspection by 'copter saves time for John Mecam executives, Hitchcock, Tex.*

NBAA Pilot Awards

(*Continued from page 47*)

42. **Russell A. McArdle,** Service Pipeline Co., Tulsa, Okla. 668,840
43. ***Marshall McDowell,** The Gerstenslager Co., Wooster, Ohio 571,387
44. **Thomas R. McFarland,** The Ohio Oil Co., Findlay, Ohio 594,455
45. ***James C. Magnus,** Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. 508,555
46. **Ernest G. Marquis,** Cluett, Peabody & Co., Inc., New York, N. Y. 888,650
47. **Samuel H. Massey,** Hercules Powder Co., Wilmington, Del. 631,112
48. **Allen F. Minich,** Sinclair Refining Co., Tulsa, Okla. 612,000
49. ***Morris J. Morgan,** Texas Eastern Transmission Corp., Shreveport, La. 983,200
50. **Carroll B. Nichols,** Service Pipeline Co., Tulsa, Okla. 902,288
51. ***Dale B. Olsen,** Aurora Gasoline Co., Detroit, Mich. 619,200
52. ***Guy H. Owen, Jr.,** Texas Eastern Transmission Corp., Shreveport, La. 920,540
53. **Walter C. Pague,** ARMCO Steel Corp., Middletown, Ohio 993,046
54. ***Ronald H. Pates,** Minnesota Mining & Mfg. Co., St. Paul, Minn. 505,980
55. **Don E. Phillips,** The Ohio Oil Co., Findlay, Ohio 830,160
56. ***Forest Bob Polston,** Sinclair Refining Co., Tulsa, Okla. 540,600
57. ***John E. Powers,** International Business Machines Corp., Poughkeepsie, N. Y. 615,400
58. ***Robert F. Powers,** Aerojet-General Corp., Azusa, Calif. 576,000
59. **Alton L. Rainwater,** Service Pipeline Co., Tulsa, Okla. 884,600
60. **Rossevelt Rammel,** The Ohio Oil Co., Findlay, Ohio. 686,155
61. ***Charles W. Reeder,** Goodyear Tire & Rubber Co., Akron, Ohio 926,100
62. **Don T. Richardson,** Minnesota Mining & Mfg. Co., St. Paul, Minn. 785,520
63. **James M. Richter,** Columbia-Geneva Steel, San Francisco, Calif. 924,364
64. ***Howard N. Riddle,** Sundstrand Machine Tool Co., Rockford, Ill. 529,980
65. **Richard R. Rigg,** Owens-Illinois Glass Co., Toledo, Ohio 778,007
66. ***John P. Rowan,** Gulf Oil Corp., Dravosburg, Pa. 655,500
67. **Herbert L. Sefton,** The Ohio Oil Co., Findlay, Ohio 689,630
68. ***Donnell E. Severts,** Service Pipeline Co., Tulsa, Okla. 602,530
69. ***William E. Shaughnessy, Jr.,** American Cyanamid Co., Stratford, Conn. 860,553
70. ***George H. Shortlidge,** U. S. Steel Corp., New York, N. Y. 634,185
71. **Stanley C. Smith,** New York Wire Cloth Co., York, Pa. 605,550
72. **Edward L. Springer,** Service Pipeline Co., Tulsa, Okla. 674,135
73. ***W. A. Stenhagen,** Union Bag-Camp Paper Corp., Franklin, Va. 600,000
74. **Karl F. Styne,** Noland Co., Inc., Newport News, Va. 803,170
75. **Frank J. Thera, Jr.,** Minnesota Mining & Mfg. Co., St. Paul, Minn. 660,780
76. **William F. Underwood,** Sinclair Refining Co., Tulsa, Okla. 900,000
77. ***William R. Verran,** The Ohio Oil Co., Findlay, Ohio 512,615
78. **James D. Wallace,** The Procter & Gamble Co., Cincinnati, Ohio 625,680
79. ***Harry W. Wallingford,** Texas Eastern Transmission Corp., Shreveport, La. 652,325
80. **W. W. Walter,** Associated Aviation Underwriters, Dallas, Texas 642,300
81. ***Hubert L. Wells,** Sinclair Refining Co., Tulsa, Okla. 557,120
82. ***Richard C. Whitbeck,** Owens-Illinois Glass Co., Toledo, Ohio 611,200

83.	***Ralph S. Whitworth, Jr.,** The Coca-Cola Co., New York, N. Y.	558,000
84.	***A. J. Wilson,** The Champion Paper & Fibre Co., Hamilton, Ohio	534,850
85.	**James M. Wolfe,** Service Pipeline Co., Tulsa, Okla.	594,432
86.	***Horace E. Wood,** The Gillette Co., Boston, Mass.	522,000
87.	**Paul E. Wynn,** Service Pipeline Co., Tulsa, Okla.	670,463
88.	**Richard A. Yoakam,** The Ohio Oil Co., Findlay, Ohio	698,905
	TOTAL	60,855,162

*For first time awarded.

Safety Digest

(*Continued from page* 42)

Wing Inspection Lights Are Not Anti-Collision Lights

Our pilots have been complaining increasingly of the hazard, not to mention annoyance, of the use of wing inspection lights for anti-collision purposes by the pilots of one of our major airlines. As you know, it is custom among airline pilots to flip on a forward shining white recognition light to call their presence to the attention of on-coming traffic; consequently, when a wing inspection light suddenly flashes in your eyes, it is only natural to become startled and possibly initiate evasive action in the belief that an airplane is approaching you head-on. This is particularly confusing and hazardous when several airplanes are milling around in a holding pattern on top of an overcast. Use of these inspection lights is also made on the ground and constitutes a blinding hazard for other pilots attempting to maneuver into tight spots on the ramp.—ALPA—TECHNICAL TALK.

Aeromedical Investigation of Aircraft Accidents—

By Col. H. G. Moseley, USAF (MC)

The physician who is confronted with an aircraft accident investigation is faced with an unusual diagnostic problem. It is a problem of identifying the cause of injuries which may have been inflicted, and it is a problem of finding the reasons for this unwelcome visitation of disaster.

The importance of the aeromedical investigation should not be depreciated. An aircraft accident is a circumstance often attended with harm or death to the human occupants. Alleviation of these traumatic effects must be based upon inquiry into cause and effect. In those accidents where the enormity of force overwhelms any protective effort, there is a responsibility for determining the cause of the disaster itself in order that it may not be repeated. When the reason for such death and destruction lies within the frailty of human physiology or aberrations of human behavior, the professional obligation to identify such causes is as great as the obligation to identify the source of a virulent epidemic. Only upon such observations can true remedial action be taken.

The medical investigation to engage these problems falls into two categories —inquiry into the cause of injury and inquiry into the human factors which may have caused the accident.

Coincident with appraisal of injuries, it is necessary to know whether or not such injuries were inevitable under the circumstances encountered, or whether they were compounded by inadequate provisions for escape and survival. Many burn injuries would not have occurred had reliable escape mechanisms been provided, and many sprains and fractures have resulted because escape hatches or exits were so situated that injury was almost inevitable if they were used. All such observations form a basis for remedial action. In connection with military accidents, injuries incurred in connection with bailouts and ejections also need be evaluated.

Directly correlated with injury are the forces to which the occupant is subjected. It is apparent that, when extremely high or explosive deceleration forces are encountered, the human structure cannot withstand the trauma regardless of protection offered. However, frequently there is injury even though the impact forces were slight or moderate. In these cases there is an indictment against protective equipment. Without knowing or estimating the force and direction of such force, it is difficult to determine whether or not structural improvements should be made. A large number of vertebral fractures occurred in crash landings of jet aircraft before it became apparent that the slap-down force of impact was causing the occupant to sink deep into the seat cushion which negated the restraint of his shoulder harness and allowed him to jack-knife forward over the lap belt. It was only when aeromedical observations on the magnitude and force of deceleration were made that this cause was discovered and subsequently alleviated by providing more resistant seat cushions.

The majority of injuries incurred in aircraft accidents are either due to the occupant being thrown upon impact or due to inadequate restraint of head or extremities with their resultant flailing during abrupt deceleration. There are very fundamental observations to be made in these areas. The first has to do with the effectiveness of torso restraint. In this respect, it is important to determine whether or not lap belts failed, seats failed, seat attachments failed, floors failed, or any other restraint or linkage did not meet the requirement of preventing the occupant from becoming a missile. An additional aspect of this investigation is to determine whether or not adequate protection was provided against flailing of the head or extremities. Even though the torso is restrained, unfixed appendages may be whipped about and injured.

The traumatic role of hurled objects needs inquiry. Even though the individual is adequately restrained and in seats which face rearward to prevent

Texas Beauty Named Miss Business Aviation

MONA GEORGE *of Pasadena, Texas, is "Miss Business Aviation, 1957."*

The 22-year-old, hazel-eyed blond was selected by the National Business Aircraft Association and presented to more than 600 NBAA members and guests at the opening banquet of NBAA's tenth annual meeting and forum at Denver, Colo.

Miss George is employed by Flight Safety, Inc., at Houston, Tex. She is a graduate of Louisiana State University.

flailing or whiplash injury, serious or lethal blows can be caused by flying baggage, tool boxes and other objects. Insofar as possible, these need to be identified in order that their traumatic role may be recognized and corrective action taken.

In addition to missiles, fixed structures often inflict injury. This may occur even in low-impact accidents because of the obtrusive or unyielding nature of such items as gunsights, knobs or metal bars on seat backs. When such items are identified, much can be done to eliminate them in future design. Any other cause of death or injury needs to be traced to its source and conclusions drawn as to what could be done to prevent it. The most frequent injuries not directly due to deceleration are burns. Upon medical burn observations, the USAF has been instrumental in developing more resistant clothing and establishing the requirement to wear gloves. Much additional remedial action needs to be taken to eliminate the source of such burns, and no inquiry in this area is too trivial.

Human Factors As Cause of the Accident

When the medical investigator attempts to determine whether or not pilot error may have contributed to or caused the accident, he is confronted with a formidable problem. In the aircraft wreckage, there are no fragments of behavior or atmospheric vacuums that serve as tangible evidence of acts or omissions which may have precipitated the course of events which ended in the accident. However, by working with other investigators, definite conditions concerning the flight and the aircraft itself can be established. Upon these observations, it frequently becomes apparent that some unsafe act on the part of the pilot (or crew) led to the mishap. The reason why, then, becomes a matter of concern. Here it is essential to realize that pilot error does not of necessity imply neglect or fault on the pilot's part. On the other hand, such error may be the result of circumstances with which he was physically or physiologically ill-fitted to cope or as a result of problems which he had not yet learned to solve. The medical inquiry, therefore, can follow the influences which have the most significant effect on the human operator.

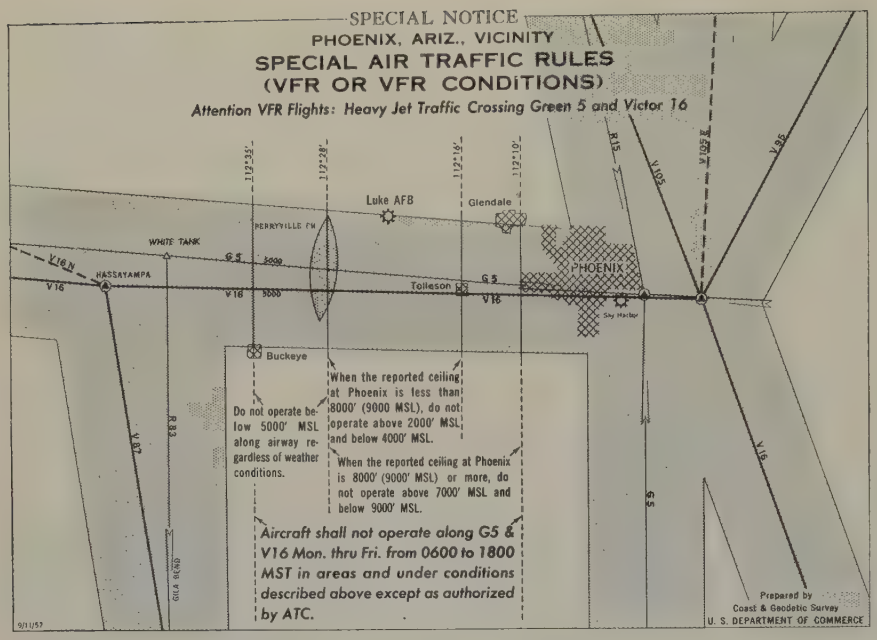
There are three major areas where adversities or inadequacies may induce the pilot to err and lead to an accident: the pilot's physiological tolerances, the pilot's behavioral variances and the pilot's physical condition.

DISCIPLINE DELINQUENCIES: Modern flying and particularly flying high performance aircraft, requires rigid adherence to certain basic precautions and rules. Poor flight planning and poor in-flight discipline—i.e., attempting to fly VFR under IFR conditions—are the most frequent causes of in-flight collisions. To this must be added poor supervision, particularly in flight scheduling, which can lead to midair collisions. These poor disciplines should always be considered when controlled flight ends in a collision.

COMPLICATIONS AND DISTRACTIONS: During landings, take-offs and go-arounds, the work load placed upon the pilot is considerable. If during this time, minor irregularities or emergencies arise, he may become overwhelmed and have an accident. Here again, there is a necessity for identifying such complications and distractions in order that they may be eliminated.

Finally we come to the pilot's physical condition. Flying requires that the pilot have certain minimums of physical strength and endurance and that he be physically able to give continuous application to his occupation during the expected conditions of flight. Occasionally, pilots are unable to meet these physical requirements due to fatigue, illness or physical disaster. Such inadequacies or unwelcome infirmities are usually unpredictable, and there is no particular pattern as to the type of accident which may result. In addition, such accidents usually leave no mechanical clues as to their cause. Their discovery rests upon exclusion of other causes and inquiry into definite areas.

INSUFFICIENT STRENGTH OR STAMINA: Although inability to reach controls or insufficient strength occasionally leads to accidents, the most frequent cause in this category is fatigue. Whenever accidents occur after



prolonged periods of flight, and are due to some omission or mishandling, and cannot be explained by inexperience or other factors, fatigue is implicated. Although difficult to establish, it may emerge as the only plausible explanation.

TEMPORARY ILLNESS: This is an infrequent cause of accidents because the ill pilot seldom flies. There are two factors, however, which need to be considered whenever it can be determined that the pilot was suffering from a temporary illness. The first is whether or not he may have developed severely diverting symptoms from such conditions as headaches, earaches or sinusitis, and whether or not he may have been taking medicines with suppressive or hypnotic effects or an anaphylactic potential.

SERIOUS PHYSICAL INCAPACITATION. Serious incapacitation may arise suddenly and lead to an accident. Such conditions as heart attacks are rare and are ordinarily discovered only by careful post-mortem inquiry. However, accidents occasionally happen because of other serious conditions, such as epilepsy, and offer little or no pathological evidence. Their discovery rests in a careful review of the individual's medical history and particularly inquiry into concealed attempts at self medication.

Conclusions:

The aeromedical investigation of an aircraft accident is concerned with discovering the causes of injury and determining the human acts which may have led to the accident.

The investigation of injury requires careful inquiry into cause and effect and detailed examination of forces and objects which produce injury. It also requires review of protective devices which prevented or failed to prevent injury.

Investigation of human error which may have led to the accident, and the cause of such error, is also required. This entails an evaluation of adverse physical or physiological influences, a full appraisal of the pilot's clinical history, and, on occasion, careful pathological inquiry.

The need for thoroughness of such inquiry is great. The causes of aircraft accident injuries and particularly the human causes of the accident itself are frequently difficult to establish. But only when such causes are found can effective corrective action be taken.—AERONAUTICAL ENGINEERING REVIEW—

Scrape and Go

"We were on a cross-country in a Grumman Tracker and about 0900 departed Quonset Point for Milwaukee. Our first stop was Detroit for gas and we made an actual GCA there, refueled and refiled for Milwaukee.

"Milwaukee was expected to remain right at minimums of 400 and one or possibly go lower. Our alternate was Terre Haute. We arrived over Milwaukee after about 2 plus 30 en route, having been on continuous instruments with moderate icing. Milwaukee approach control set up an ASR approach. At the minimum of one mile the copilot advised that he had the runway in sight but it was too far to the left.

"I called and asked for a low visibility visual approach. Clearance was given and we were told to switch to tower frequency. When I waved off I unconsciously picked up the gear.

"My full attention was directed to keeping the field in sight and the copilot was busy trying to switch to tower frequency. Lineup was made with the runway and a landing started. The first indication I had of anything amiss was a scraping sound about the time I should have been touching down.

"Sure enough the gear handle was UP and so I held what I had and applied power. We became airborne and landed on the next approach. We were surprised to see only about three inches gone off the fosdick and nothing else wrong. Upon later inspection at the squadron it was found that my props could only have been an inch off the runway when I applied power." —APPROACH—

Look Out Below

After giving a routine position report 20 minutes from destination Anymouse experienced complete transmitter failure in a Twin Beech. No expected approach time had been received and the flight was in IFR conditions.

"There was one reporting point between the last reported position and destination," said Anymouse. "This was passed at the reported ETA for that point, but no revised ETA at destination had been given to ATC. Indicated airspeed had been reduced by ice, despite all efforts to deice with boots and prop anti-icers. "I commenced holding at destination and at the completion of one circuit, I commenced my approach at my flight log ETA. This was nine minutes before my flight plan ETA. Fortunately there was no other traffic, and the descent and landing were uneventful. Nevertheless, my faulty thinking as to which ETA to start my approach on could have been more embarrassing than it was.

"It could have spoiled my whole day!

"P.S. The radio antennae had been carried away by ice."

Gramps, this is one of those situations which cause air controllers to call the ATC Center "Ulcer Gulch." The two-way radio failure section in the Supplementary Flight Information Document has recently been amended and expanded. A review of this plus the dope on sending a revised ETA when estimate is in error in excess of three minutes may prevent your day from being spoiled by a collision!—APPROACH—

The Razor's Edge

"I was flying a pre-briefed photo hop, at an altitude of 10,000 feet in an F2H-2P with my estimated TAS about 350 knots.

"On the fourth run I had rolled in on heading after scanning thoroughly over my proposed flight line. I was making a quick check of my flight path through the viewfinder when, without warning, the cockpit darkened as would be expected when your wing blocks out the sun, and the plane was buffeted downward.

"The entire incident happened within a fraction of a second and I looked in all directions immediately but did not see any aircraft. Later on in the period several jets made passes and I thought about the earlier incident. My conclusion at that time was that a jet had made a pass and passed close enough to cause the buffeting.

"Upon returning to the squadron, there was a message for any F2H pilot who was in the vicinity of Blank AFB at 1140 to call the station operations officer. The operations officer informed

that an AJ pilot had reported a near midair and after contacting the other pilot I learned just how close that photo hop was to being the last one. The other pilot said that he saw me and pulled up and over at the last possible moment.

"This was a head-on situation and I would estimate the other aircraft's TAS about 250. Weather at the time was VFR but both planes were the seagull gray and white. There was a high layer to the north in the direction I was flying and a low overcast to the south.

"My advice is to stay away from the even altitudes when on tactical flights and regardless of altitude, beware of the clear sky with a white background." —APPROACH—

A 10-Cent Strap

"You know that little leather strap in the Twin-Beech that holds the control lock down on the deck when it is snapped in place? Well, all the pilots in this outfit had been stepping on it for months and knew that one end of the strap was gone along with one-half of the snap. So what?

"Ordinarily nothing, but on this particular day high winds were predicted for the afternoon with extreme gusts. However, there wasn't any reason why we couldn't get two or three hours in before noon.

"Close to lunch time, we entered the pattern with everything normal. Of course, it was rough but still no real problem. The pilot had 2700 hours, the copilot almost 5000. Getting back to that control lock, I know I have spent anywhere from 10 to 20 minutes trying to get the lock in place, the pins in the rudder pedals and the rest of it screwed into the yoke. So has every other Twin-Beech pilot at one time or another.

"But guess what happened when we were about 300 yards from the end of the runway at about 50 feet altitude. We hit a terrific gust. I glanced at the pilot, noting the consternation on his face. He was kicking at the rudder pedals and was unable to correct for drift. At the same instant, I saw that red rod up off the deck.

"You wouldn't believe it anyway if I said the pins went in, but if you try it, you'll find the pins can block the rudder if they are simply behind the pedals.

"We took a waveoff, the pilot got down under the yoke while I held it straight and got the pins back out. We have a new strap on that lock now."— FROM MAG 12 AVIATION SAFETY BULLETIN—

Flash Point

"KEROSENE in a bucket was being used to clean engine parts in the power plants shop. It was left sitting in the open overnight. Next morning cigarette butts were found floating in the kerosene!—APPROACH—

Light Conversation

"On a routine night proficiency flight in a JD-1, I was scheduled with a co-pilot not familiar in the model. An uneventful roundrobin was completed with a standard instrument approach ending the hop.

"On pull up over the field and while preparing for downwind leg I used a flashlight and indicated to the copilot, with his confirmation, the position of the landing lights and indicated I would signal for them on turn to final.

"As I turned to final I signaled and called "landing lights" and received a 'roger' in reply. I was aware that the copilot had his hand to the switches but no lights came on. I continued the approach making a satisfactory landing without lights and started to taxi into the line.

"On the way in I attempted to find what was wrong with the landing lights. Between checking my clearance to other aircraft, following a dog-leg in the taxiway and indicating again to the copilot the position of the proper switches, I suddenly bounced off the taxiway.

"I knew that construction was underway (holes 2½ to 3 feet deep connected by ditches) and how far into the boondocks or exactly how I managed to miss all the obstructions, I don't know.

"The lights didn't get turned on until I was safely back on the taxiway. I do know the next time I have to have someone not qualified in the right seat I am going to be more thorough in his checkout. The reason for no lights was the fact that I was being given oil dilution by similar switches located alongside the landing light switches."—APPROACH—

Say Again

"After landing on a runway, where a 15-20-knot wind was blowing pretty much down the runway, I turned off slightly before the end and started crossing the mat back to the line.

"I must have had that feeling that 'the flight is over now' because I pulled up the flaps and did a few more like things. Worst of all, I relaxed while crossing the milelong mat area. The idle power drained the battery so that when I called ground control for permission to cross another runway, I accepted a non-intelligible answer for permission to cross. My attitude was that I didn't really need to do that anyway—they couldn't possibly use any other runway because of the wind.

"But thanks to over 4000 hours and instinct and/or training, I did look up and down the runway before crossing and was very startled to see an F9F-8 only a few hundred yards away roaring down my way.

"Fortunately, I hadn't started moving and after that I used more power and got a clear permission from ground control to cross. You gotta stay alert in this flying game."—APPROACH—

PICK 'N SHOVEL NIGHT *was enjoyed by the mule and, from left, Morris E. Triggs, Pratt and Whitney, Hartford, Conn.; Charles Potter, Pacific Airmotive Corp., Los Angeles, Calif.; Ed "Sheriff Scotty" Scott of Denver, Colo.; George Keller and Ed Berkert, PAC.*

See Story

"VFR with 10 miles-plus visibility . . . destination in sight . . . commenced descent from 5000 on autopilot . . . no other aircraft in view . . . began item by item checkoff list for landing . . . look-see-and-touch method.

"On completion of the second item I looked up for other aircraft and found a C-130 Hercules trying to occupy the same airspace. He was approaching head-on and had started a right turn. Estimated clearance was about 200 to 300 feet.

"I had not previously seen this aircraft even though I felt I was keeping an alert lookout. This was off airways flight over sparsely populated area. You have been preaching about this—my error."—APPROACH—

Old Stomping Grounds

"Our hero, Plane Commander Anymouse, was proceeding on an IFR night cross-county in a Super-Connie from an east coast air station to NAS Dallas. Approaching Dallas, Anymouse remarked nonchalantly to his wide-eyed copilots, 'this is my old stomping ground. We might as well go VFR and shoot straight over to the field'.

"Number one copilot timidly: 'But sir, shouldn't we at least proceed to the range station and take up a heading for the field?'

" 'Nah. That takes too much time. I was GCA officer here for years; I know this country like the back of my hand; we'll just kick her around and make this our downwind.'

"A moment later this Anymouse banked violently to the left to avoid a television antenna and remarked, 'G*%! Some stupid character put a TV tower right in the traffic pattern.'

"Copilot uneasily: 'Sir, that runway looks awfully short; are you sure . . .'

" 'Yeah, they all look shorter at night. Hensley is the only field right around here with runway lights. Tell the tower we're turning base.'

"About one mile out on final approach Hensley tower came up and said, 'Navy ————do not have you in sight. Believe you are making approach to Redbird Field ——'.

"Anymouse: 'Gear up — METO power, etc. . . ."—APPROACH—

Vision Transition

The increase in stage lengths of flights has introduced a new problem to pilots, namely, rough landings. Conversely, at the end of short-haul trips pilots almost always make very good landings. Why?

The problem seems to lie in the eyes' indisposition to accurate distance and depth perception after relatively long periods of flying at high altitudes. There being nothing outside the cockpit for the pilot's eyes to focus on, his focal distance becomes established at a mere three-and-a-half feet. Therefore, at the end of the trip, when the pilot comes in for his landing, this induced muscular lethargy of the eyes produces inaccurate distance and depth perception. The result: a landing you can't brag about.

On short-stage flights where altitudes are relatively low and frequent landings are made, the pilot's eyes are constantly exercised by focusing on objects first inside then outside the cockpit. The result: good landings, smooth as a . . . well, really smooth and gentle.

Pilots flying the high-up and fairly long trips recommend the following as a solution to the problem:

On your letdown to the airport and beginning at an altitude of about 1000 feet, give your eyes some tune-up by looking back and forth from the instruments inside the cockpit to the horizon as well as to objects on the ground. Then, by the time you come in over the threshhold, your eyes will have "limbered up" to give you instant and accurate depth and distance perception. The result: continued good landings.

Try it, if you've made some rough landings lately.—CAA AIR SAFETY DIGEST—

Twin Beechcraft Tailwheel Locks

The push-button guided missile air force isn't here yet; and no evidence could be more convincing than the rash of Twin-Beech tailwheel accidents we've had lately. You just have to have respect for the old secret weapon's ground loop ability. You may get out alive, but it's still an accident, it still costs money to repair and you'll still be visiting the investigation board. We have had three recent cases where pilots were in a hurry to get off the runway for one reason or another.

Down they go for the tailwheel lock, then around they go like a two-bit ride at the fair grounds. Don't be in such a panic to unlock. Let it slow down. And, as any Twin-Beech IP will tell you, "fight it to a standstill, straight ahead."—SAC—USAF

Forecaster to Pilot—

By Maj. Horace W. Meredith, USAF

Objective operational control is needed to curtail navigational accidents in mountains as the winter mountain storm season starts.

Pilots, navigators, weather forecasters and operations officers should concentrate on this problem now by reviewing all aspects of orographic weather, such as upslope and lee effects, mountain waves, false altimeter readings, icing, turbulence and radio interference. This training should be followed up by establishing specific limits for acceptable operating conditions over each mountain route.

The study of weather navigation problems should cover the basic concept that moist air flowing over rough terrain churns up heavy nimbus clouds with maximum icing, turbulence, radio interference between 0°C. and minus 10° C., and that the degree of hazard is directly related to the wind speed. The hazards occur together and deception lies in the fact that when the weather is good over mountain routes the navigation is so simple that distant peaks look quite harmless. But when a moist wind moves across the mountains, all of the trouble comes with it.

Failure to set a good flying safety record over rough terrain is a result of failure to adjust flight plans to high winds. The following simple rule is recommended for safe operations: When flight altitude is to be below the height of terrain within 100 miles of course, check upper winds closely and reroute or delay the flight if wind speed is over one-third of the airspeed. This rule should be applied especially for flights at any altitude if the loss of an engine would reduce the aircraft ceiling to a height below the highest terrain.

The fall and winter seasons each year are infamous for navigational accidents. Last fall, the first jet stream that dipped down over the US Rockies blew an airliner into Medicine Bow Peak. Later an Air Force transport became disoriented in high winds and hit a mountain in Nevada. The "Stacked Deck" for the KC-97 that crashed in the Adirondacks was primarily a 70-knot wind in the Griffis AFB holding pattern. The most intense storm of the winter snuffed out the largest number of lives when a four-engine Canadian airliner, with one engine out, fought winds of over 100 knots and was blown into a mountainside.

High speed wind over rough terrain is as hazardous to flying as low ceilings and visibilities, and yet flying organizations have not universally adopted wind speed limits to control flying over mountain routes. Try establishing wind speed maxima over mountainous air routes for each type aircraft to preclude the next navigational accident. —USAF FLYING SAFETY—

Aircraft Fire Accidents of 1956

Eighty-seven large-loss aircraft fire accidents occurred in the United States, Canada and offshore North America in 1956, according to the National Fire Protection Association. These accidents cost 336 lives and represented approximately $123,000,000 in property losses, including the aircraft involved.

These 87 accidents involved a total of 442 aircraft occupants. Of the 336 killed, 301 were aircraft occupants who died in the accidents, and 4 others were rescued but died subsequently. The balance of the fatalities, 31, were people on the ground who died because of these accidents. Of the survivors, 99 escaped unassisted, 21 parachuted successfully and 17 were rescued alive by fire fighters, observers or others aboard the aircraft at the time of the accident.

The accidents reported here involved 81 military aircraft (including 1 airship and 2 rotary aircraft) and 6 commercial or private aircraft. Of the military, 59 were U.S. Air Force aircraft, 18 were U.S. Naval aircraft (including Marine Corps), 1 was an Air National Guard aircraft and 3 were Royal Canadian Air Force aircraft. Of the commercial and private aircraft, 4 were airline aircraft and 2 were executive or business aircraft.

Sixty-seven of these aircraft fire accidents occurred following ground impact, 19 originated as fires-in-flight and 1 was a ground fire accident (the airship). As to location of these accidents, 70 per cent (61 incidents) occurred off airports and 30 per cent (26 incidents) happened on airports.—NFPA AV BULLETIN NO. 190—

Fly VOR Centerline? Or, to the Right?

(A recent article suggesting Pilots be allowed to fly to right of centerline on VOR Airways has drawn both concurrence and opposition. Here is an Alternative Answer.) By—Capt. L. F. Abel, CAP ALPA Representative, Washington Airspace Panel.

Fears Hazard

Flying a few degrees to the right of the centerline while flying under actual instrument conditions in an area where two Victor airway radials diverge at 15 degree-angles from the station, an extremely hazardous situation is created.

As you know, an air traffic controller may assign the same altitude to two aircraft on adjacent Victor airways when the airway radials diverge from the station by 15 degrees or more and the aircraft involved are a distance of more than 15 miles from the station.

Our present VOR airway system has long been established using this criterion and the primary airways as well as the alternate Victor airways used for climbing and descending, are designated in most cases with exactly 15 degrees lateral separation. With this airway pattern no vertical aircraft separation is necessary and climbs and descents through the altitudes of cruising aircraft may be made by utilizing the alternate VOR airways.

From the pilot standpoint this 15 degree lateral separation, with no vertical separation, is very critical.

Some time after this 15 degree lateral separation principle had been adopted and a large number of VOR airways already established, someone began thinking about the various errors possible in the VOR navigation system. The errors inherent in the ground station and the airborne receiver combined with the pilot's ability to fly the indicated centerline within certain tolerances posed some serious questions regarding the adequacy of the airway system. As a result, the Radio Technical Commission for Aeronautics formed Special Committee 62 to study the problem and I was asked to serve as ALPA's representative on this committee. After many months of deliberation and statistical analysis, which involved not only theory, but included laboratory bench checks of airborne receivers and 6,000 airborne checks by air line pilots on regular runs, this committee's report was published. The 15 degree lateral separation criterion was found to be adequate on the basis of probable errors (not malfunctions) in the VOR ground station and airborne receiver, but left only plus or minus 1½ degrees as the tolerance which the pilot was expected to adhere to in flying the indicated centerline. If this pilotage tolerance is adhered to, a 5 degree buffer zone between adjacent airways will be provided with a statistical probability of better than 99.9 per cent. The usual Flight Path Deviation Indicator or VOR course needle presentation in our cockpits will show a 20 degree scale with respect to the VOR course which has been selected. This means that the needle which is centered and the needle which rests on the last dot on the indicator represents a difference of 10 degrees.

From the foregoing it should be realized that the pilot is expected to adhere to rather critical tolerances in presentday airway flying.

The practice of flying a few degrees to the right of a VOR airway centerline may have some advantages under VFR weather conditions and in some locations, but when flying under actual instrument conditions with another airway which diverges only 15 degrees, the pilot had darned well better do his utmost to center that needle! This does not sanction the use of the VOR needle associated with the RMI indicator, because this system does not give VOR course information with the necessary degree of accuracy.

Another small disadvantage which would occur with the use of this right side philosophy would be the poor positioning at some Omni intersections. Many of our radio fixes are very poorly defined because they are predicated on an Omni radial which intersects the course radial at an acute angle. Any deviation left or right from the course centerline results in an erroneous fix and an inaccurate position report which affects the efficiency of the air traffic control service provided.

While the VOR system is unquestionably more accurate than the LF system, it is possible that right side separation may not be affected as easily with the VOR. Barring a swinging range leg, a pilot could be fairly well assured that he was to the right of the LF centerline when he received the appropriate off-course signal even though he might not know how far to the right. A study of the errors inherent in the VOR system will show that a pilot has no assurance that he is to one side or another of a precise course, and indeed he may even be led closer to a collision course when he tries to outguess the system, than would be the case if he flew the indicated centerline and allowed the usual system errors to provide random separation.

Sees Step Backwards

In my opinion a return to the right side concept is a step backwards. I feel that we should concentrate instead on a revised airway structure designed around the pilot's ability to adhere to reasonable tolerance while coping with the ever increasing cockpit workload. The communications burden combined with the complexity of the existing dog-legged airway structure and presentday aircraft speeds, leaves the pilot little time to concentrate on holding a precise course in many instances. I would personally like to erase the present airway map and start all over again.

While we must live for awhile longer with the present airway structure, an alternate to one individual's recommendation (which was to fly to the Right on VOR Airways) might be the encouragement of greater use of the alternate Victor airway system by both pilots and controllers. This is an airway structure which is not fully utilized by controllers to expedite climbs and descents and might be used advantageously by pilots when flying VFR.—THE AIR LINE PILOT—

A COMMERCIAL PILOT RECENTLY ABORTED takeoff when he was unable to maintain directional control with nosewheel steering. Teardown inspection disclosed the steering mechanism to be damaged resulting in locking of the nosewheel 15 degrees right of center. The cause is unknown but it is believed that abnormal loads imposed on the nosewheel by steering without the aircraft being in motion could cause this condition.

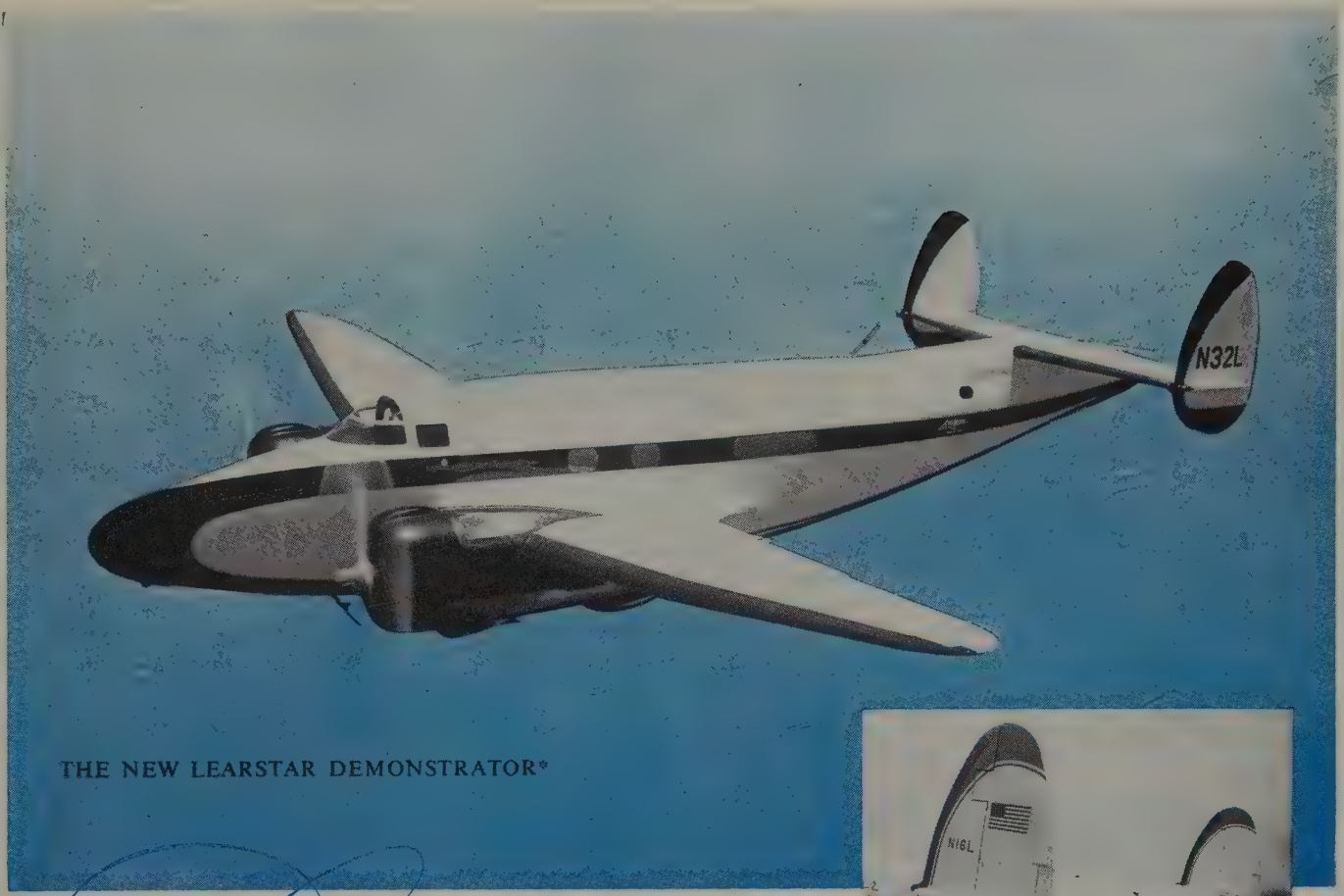
FLYING RUSSIAN ROULETTE! It is difficult to see how the pilot who plans his flight with due regard for appropriate restricted-area charts could plot a track that would take him through a danger zone. But aircraft still court trouble flying where they shouldn't. Pilots may have nerves of steel but why risk loss of aircraft and crew flying needlessly through ack-ack, missiles and falling bombs—ours?—THE MATS FLYER—

40,001 Stall Detector Delivered by Pioneer Instrument Manufacturer

Safe Flight Instrument Corporation's 40,001 Stall Warning Detector was delivered to the Cessna Aircraft Co., Wichita, for installation in a new Cessna 310.

The Stall Detector is standard equipment on all Cessna, Beech, Aero Design and Mooney aircraft. It is in use on planes flown by seven of the world's airlines.

GEORGE THOM, *right, Safe Flight sales representative, meets Frank Martin, left, and Bill Ferguson, both of Cessna, for delivery of Stall Warning Detector.*



THE NEW LEARSTAR DEMONSTRATOR*

...from LODESTAR to Learstar step by step

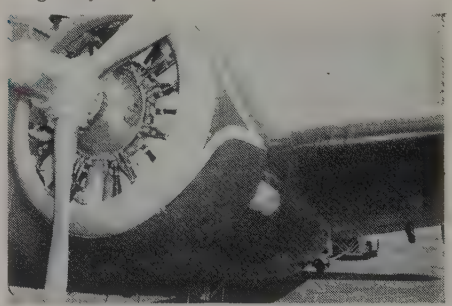
Any Lodestar in the air today can now be brought up to date under a plan which combines low down-time with progressive modification leading to a complete Learstar. New standards of safety and efficiency are gained, structural reliability is increased, flight characteristics improved, cruising speed increased and range greatly extended. This is the "step by step" program that brings your Lodestar into the famous Learstar class – the world's only business transport that exceeds airline specifications.

Lodestar owners and operators are invited to write for details of PacAero's new "step by step" program explaining how the advantages of airline transport category 4-b can easily be obtained – how your Lodestar investment will be strengthened and how you can take advantage of favorable tax allocations. Regardless of what type of business transport you now own or operate, you will be interested in learning about Learstars now in the process of remanufacture in our plant, and how they may be "customized" to fit your specific needs. And, to provide complete, see-for-yourself details, PacAero's new Learstar* shown above is available for demonstration flight at the convenience of you and your executives. For appointment, please contact PacAero Commercial Sales Division.

PACAERO ENGINEERING CORP.
3021 Airport Avenue, Santa Monica, California
EXmont 1-5281

PACAERO

Combination step of Learstar Rudder Spring Tabs and Learstar Wheels and Brakes, shortens Lodestar's legal runway length by 900 feet.



Learstar engines and props step includes 1350 hp Wright R-1820-56A or -72A engines, new Hamilton-Standard 33D50 square tip props, new design short stacks.

Learstar remanufactured wings incorporate additional auxiliary fuel tanks providing total capacity of 1114 gallons. New leading edge configuration eliminates drag, provides greater stability.

Navicom

(*Continued from page* 31)

niques would achieve increased range only through substantial increases in the power of the radar. For example, if it is necessary to *double* the range at which an aircraft can be spotted, such methods would require a *16-times* increase in power. A 10-times increase in range would require a 10,000-fold increase in power.

The Air Force-Columbia program utilized fundamental principles of communication theory to achieve its results. The Columbia work, in addition to certain basic theoretical contributions, undertook to achieve an experimental system which would embody the best theoretical use of signal energy to "enhance" radar signals.

Such an experimental system is now being demonstrated at the Armstrong Laboratory. It is not open to inspection because the work in progress involves certain security classified details in its military applications.

This is of great significance to the air transportation industry, the flying public and the government agencies operating our complex and overcrowded systems of airways. The very great value that the use of radar has proven in increasing both the capacity and safety of that system has additionally served to highlight the outrageous inadequacy of the equipment currently available and in use.

Even the "latest, modern" radar equipment used for close-in traffic control (Airport Surveillance Radars) is so subject to crippling disablement by weather phenomena and interference that it is often useless or below an operational level adequate for continued operation at times when pilots and controllers need its help most. Long range radar displays in control centers are still primarily the ancient, obsolete WWII navy shipboard types and require almost fantastic ability and ingenuity of the ATC men to safely direct fast-flying aircraft in bad weather through hi-density areas.

Civil radar operations are still literally "in the dark" despite the apparent ability of the industry's prime manufacturers to engineer the latest advances into such installations. Mis-leading photo-ads of civil airport radar working in broad daylight, and items in electronics trade papers of hi-contrast CRT displays only emphasize that the money-swollen TV industry is years ahead. Entertainment before safety!

The cost of each civil radar installation being reckoned in the millions, the economies that could be effected by the new multi-fold increase in effective range almost overshadow the target response factor of this development. Civil aviation merits this development now!

Use of Direct Frequencies at Keeler (Chicago Area)

Effective September 1, 1957, the Chicago and Detroit Centers are utilizing direct pilot/controller communications on all Westbound aircraft proceeding over Keeler. After receiving the Keeler position report, the Detroit Center will change Westbounds over to Chicago Center Frequency 126.5 or 353.9. It is hoped this procedure permits more expeditious handling of flights proceeding to Midway and O'Hare via this route.

This procedure is also the first step in Chicago Center planning to utilize automatic direct pilot/controller communication with all flights entering the area. The second step will be to implement this procedure in the area east and southeast of Chicago. The third phase will then be to utilize the procedure in the area west of Chicago. Any comments or suggestions pertaining to the above procedures will be welcomed by this office.—CHIEF, CHICAGO AIR ROUTE TRAFFIC CONTROL—

Automatic Antenna Selector

Automatic Antenna Selector, designed to eliminate the effects of antenna shading in military and commercial aircraft, has been announced by Autonetics Division of North American Aircraft, Inc. Use of this selector in conjunction with multiple antenna

systems, eliminates either manual switching to select an exposed antenna, or use of a coaxial "tee" in feed lines. The antenna selector alternately monitors communications signals and automatically selects the correct antenna to provide uninterrupted reception, even under flight and atmospheric conditions that would frequently cause severe fading, a hazard in airways communications.

The Automatic Antenna Selector may also be used in conjunction with navigation systems, assuring a continuous signal to airborne navigation equipment. This eliminates the possibility of equipment cycling during a temporary loss of signal.

Etched circuitry and complete transistorization assure high reliability. Small size, weighing only 2.5 pounds and measuring 4 inches x 5 inches x 6 inches (including shockmounts), eliminates installation problems—only one cable connector.

It will withstand 30-g impact shock. Transmitting antenna selection is automatic, the last antenna used for receiving is automatically selected by the antenna switch for transmitting but the pilot may manually select transmitting antenna. Similarly the unit contains provisions for manual override selector for receiving antenna.

Power consumption at 0° to 71°C, with amplifier, is 70 milliwatts @ 28-volt dc; without amplifier is 40 milliwatts @ 28-volt dc. Below 0°C, add 15 watts for a thermostatically controlled unit heater.

New Ryan Automatic Navigator

Ryan Aeronautical Company has announced an advanced version of their electronic automatic navigator built for the Aviation Department of the Army.

The new Model 108, which has just been installed in an Army L-20 De Havilland Beaver, is the lightest self-contained Doppler navigator in flight use by any of the military services.

The new device not only provides ground speed, drift angle, latitude and longitude, and automatically computes and indicates wind, but also automatically computes and indicates the course and distance to a pre-set destination. This is done without need for ground facilities, or any other conventional navigational aids now used by pilots, and it operates in all kinds of weather at altitudes from sea level to more than 25,000 feet. It actually operates on the runway.

The "Doppler"-type system derives its name from Christian Johann Doppler, a 19th-century Austrian mathematician who was the first to describe the change in frequency of energy waves caused by movement of the observer in relation to the wave source.

In the case of the automatic navigator, the "observer" is the receiver-transmitter constantly moving with the plane in flight. The Model 108 receiver-transmitter is a small, completely sealed black box which transmits to the ground two narrow beams of microwaves. When they strike the ground, some of their energy is reflected back to the receiver-transmitter. As the plane moves, the frequency of the waves is changed slightly by the "Doppler effect." The amount of this change, measured with high accuracy automatically, gives the plane's ground speed.

But since the plane is almost always drifting sideways, under the force of winds, the automatic navigator determines this drift, at the same time also noting the heading from the plane's compass. A computer then automatically figures the present latitude and longitude, the magnitude and direction of the wind, the distance remaining to the destination, the most direct course to the destination, and the course error, if any. All this information is instantaneously correlated and displayed to the pilot.

When a Procedure Turn Is NOT Required

With the variety of approaches now

being used, there are many occasions when a pilot is not quite sure whether he should make a procedure turn before starting his final approach to the airport of landing. In order to eliminate this confusion:

1. A procedure turn is *not* required when final approach is begun from a holding procedure associated with the let-down.
2. A procedure turn is *not* required when the aircraft is vectored onto the final approach by radar (normally used to provide ATC separation).
3. CAA normally authorizes "straight-in" approaches when:

a. On L/MF, ADF and OMNI range procedures, the approach is from a fan marker or other reliable fix either on or within 30° of the basic final approach course and within 10 miles of the facility.

b. On ILS procedures when bracketing of the localizer course (inbound) can be accomplished prior to intercepting and commencing descent on the glide slope to authorized minimums; provided that the localizer course (inbound) can be intercepted within 10 miles of the outer marker or final approach fix on a final transition course specified in the ILS procedure from an established radio fix or holding point not more than 20 miles from the localizer interception point and the interception angle does not exceed 15° for each mile of the interception point distance from the outer marker, up to maximum of 90°.

Portable Aircraft Orientation Unit

Of special interest to business fleet and fixed base operators will be a precision aircraft orientation unit, called the "MAGNAROSE," which has been designed to simplify and accelerate the accurate alignment of aircraft on desired magnetic headings for compass

swinging purposes. Developed and manufactured by Eastern Air Navigation Service, 157 West 54th St., New York City, the Magnarose is an improvement over methods presently employed to swing aircraft and offers a simple solution to an otherwise costly and time-consuming operation.

The Magnarose eliminates the guesswork of aircraft alignment—allowing instant orientation of aircraft of any design, size and weight on correct magnetic headings to an accuracy of one-tenth of a degree.

The permanent ramp compass-rose or cumbersome turntable is eliminated. Since the compass swinging procedure is not confined to any one location, the usual bottlenecks experienced with present methods are eliminated. The complete unit weighs approximately ten pounds; is easily installed and ready for use, and does not require a specially trained technician to operate.

The Magnarose is not airborne equipment but is installed only for the compass compensating procedure. Since the complete operation is conducted from the cockpit, the hazard to outside personnel is eliminated.

Although the Magnarose is designed primarily to orient airplanes for compass compensating purposes, the unit is readily adaptable where correct alignment is desired for installation and calibration of other aircraft equipment. For such work (other than compass calibration) the aircraft may be conveniently oriented inside the hangar.

Although an instrument manufactured with care and precision, it is rugged enough to withstand normal shop usage without interfering with accuracy.

Standard equipment includes a universal bracket, adjustable tripod and strong carrying case. Inter-communication facility for use on extra large aircraft and self-powered lighting for night use is available at slight extra cost.

General News

Oakland (Calif.) Airport Looks Better 'n Better

The first tenants have moved into the Port of Oakland's first 24 hangars built specifically for corporate and private aircraft at the Metropolitan Oakland International Airport, Oakland, Calif.

There are 16 strip-type T-hangars built at a cost of $189,940, plus four special hangars with shop space, four corporate plane hangars and a plane washing area. All hangars have been rented.

"ANIP"—New Television "Eye" Lets Pilot "See" Terrain In All Weather, Eliminates Instruments

The something new which might be the missing link between man-and-machine in weather, has been announced as "ANIP."

The television "eye" enables pilots to "see" the terrain under all weather conditions. It is known as ANIP for Army-Navy-Instrument-Program.

What this does is to fit the aircraft to the pilot rather than continue attempts to condition the pilot to the overwhelming demands of modern aircraft.

ANIP will make obsolete six basic cockpit instruments: artificial horizon, directional gyro, air speed, altimeter, turn-and-bank and rate-of-climb.

Cmdr. George W. Hoover, project officer for the Office of Naval Research, is responsible for the development of the system. He says ANIP consists of a two-dimensional picture presented on a flat, transparent television tube 20 inches wide and 11 inches high. The tube is fed continuing information by a lightweight electronic computer to supply the pilot a third-dimension perspective of terrain and sky information.

Greater Early Warning, Proximity Warning Devices Near—Lockheed

At the opening session of a three-day symposium on airborne early warning progress at Burbank, Calif., Robert Bailey, Lockheed chief advanced systems research engineer, said that airborne radar crews are on the brink of infinitely greater early warning and proximity warning protective devices.

"Today we know how to scan the air over 200,000 square miles of ocean area from a single airplane with a continuous sweep of invisible electronic rays," he told the group. "We can make one radar airplane do up to 50 times the work of a surface station, in any kind of weather."

According to Bailey, a second generation containing already proved scientific devices can overcome all electronic idiosyncrasies and further improve radar planes' efficiency including proximity warning.

Airline Testing Equipment Applicable To Corporate Planes

An airline is testing equipment which, if it proves acceptable, will benefit corporate aircraft as well as airliners.

Equipment to be line-tested during the remainder of this year and all of next year will be daylight type radar indicator tube, doppler navigator (Radan), black lighting of charts, boom-type microphone, new instrument illumination improvement, HF radio noise blanker, G. E. specialized radio receiving equipment, infra-red proximity warning indicator, ATC transponder beacon, auto-alert system and shoulder harness.

Mind The Jet Blasts

According to tests, the jet blast of the Wright J-65 turning up at full power has a temperature of 380 degrees F. and a velocity of 271 knots 25 feet aft of its tail cone. At 50 feet the temperature is 213 degrees, the velocity 102 knots, and at 75 feet it's 156 degrees at 56 knots.

Unless there is a blast deflector behind the aircraft, it is advised not to taxi closer than 200 feet behind *any* jet.

Saud Orders Soundhailers

King Saud of Arabia has ordered two Soundhailers from Kaar Engineering of Palo Alto, Calif.

By Russ Brinkley, Pres.

The fact that a pioneer woman flyer, who earned her wings in an OX5 Travel-Air, showed up for the first organization meeting of the OX5 Club, resulted in the co-ed format of the organization, for which all concerned may be eternally grateful. Women, both members and the wives of members, have played a major role in the two year history of the club, since Blanche Noyes, CAA Air Marking Specialist, attended the first meeting, mainly to see what the boys were up to.

Once the ice was broken and the initial one hundred or so members decided to regulate their meeting activities in keeping with the presence of a member of the fair sex, the membership was thrown open to all qualified members on the distaff side. Very soon, the pages of the roster were embellished with such names as the still very active Ruth Nichols, Viola Gentry, Melba Beard, Helen Sheffer, Edna Whyte, Jimmie Kolp and others.

This marked the emancipation of women pilots, so far as such an aviation organization was concerned. The girls took advantage of their privilege by showing up at every meeting and voicing their opinions along with the boots and breeches set. So it was, with the weaker sex in the limelight, that male members began bringing their wives and sweethearts along to OX5 wingdings.

The results of this arrangement have proved of great worth to the OX5 Club. It is a rare occasion that members meet without the presence of at least one woman member. We have long since learned to credit the wives of members for the fine turnouts which mark most OX5 gatherings. Once a wife has attended an OX5 convention or state meeting, she is not likely to permit her husband to be absent from any ensuing wingdings.

In the OX5 Club, a woman member has all of the same rights and privileges as the male. Her chances of being elected to office are equal to those of any of the more than 4,000 male members. In fact, we have already, from the first, had a Vice-President in the person of Blanche Noyes and a woman Governor, Viola Gentry.

The era of the OX5 engine, attracted only a comparatively few girls into the flying profession but most of those who earned their wings behind the old "Model T of The Airways," are included in the new club roster. Their presence and activities in the organization have contributed much to the prestige and the enthusiasm of the OX5 Club.

Air Work Symposium

(*Continued from page* 27)

leaving the manual control alone. Let the auto-mixture control do the job, Keltner stressed.

At overhaul when there is evidence of cracking and pin holes in the diaphragm of the carburetor, it is the result of Ozone deterioration which differs in different parts of the country.

• • •

A discussion on Lycoming engines was headed by a panel which included Joe Diblin, R. T. Vandergrift, Ralph Persun, Sterling Shimer and Bill Russell.

Q: What is the advantage of chrome cylinders:

A: No corrosion, longer life. (Russell)

Q: What can be done about S6RM and S6LM magnetos filling with oil?

A: Magneto seals possibly are bad. Replace them. (Persun)

Q: What is the recommended time between overhauls and/or changes for spark plugs? of Lycoming engines?

A: Spark plugs should be changed when necessary. Clean and inspect them every 100 hours. Engine overhauls are based on periods of 600 hours, except four cylinder engines at 750 hours. Check the service bulletin for engine times. (Persun)

Q: Does Lycoming recommend using carburetor heat in the all-on or all-off positions?

A: Yes, at least you know what you're doing. (Persun)

Q: What's Lycoming's attitude on use of oil additives?

A: Additives are not recommended. They can cause detonation. No additives and no detergent oils. (Persun)

Q: What about using light weight oils?

A: Lighter weight oil lubricates as well as heavier oil; doesn't take so long to warm up; carries away heat better. (Persun)

IT'S AFIRE, *but not for long, as demonstrated by Leeder Manufacturing Co. with dry chemical fire fighting equipment.*

Air Conditioning and Refrigeration Exposition at Chicago

A four-day exposition of air conditioning and refrigeration equipment will be held November 18 to 21 at the International Amphitheatre, Chicago. It is sponsored by the Air Conditioning & Refrigeration Institute, Washington, D.C.

Motel Suggestion Would Benefit Fliers at Oakland, California

A 100-room deluxe motor hotel, with provisions for expansion, is among the projects planned for the new "Port of Oakland Industrial Park," Oakland, California, by the Stanford Research Institute.

Motel clientele would come from seven groups: private and corporate aircraft crews and passengers, Civil Aeronautics Administration personnel, commercial airline passengers and flight crews, airport industrial firms, Oakland Naval Air Station, highway travelers and visitors to industrial firms in the area.

The number of potential customers from the nearby airport should be very large when the new airport is completed, the report said.

The Port now is engaged in a $15,000,000 expansion of Metropolitan Oakland International Airport.

Suite 344

(*Continued from page* 12)

Member (1949-1957) of this Association and in grateful recognition of his vital contributions to American business flying.

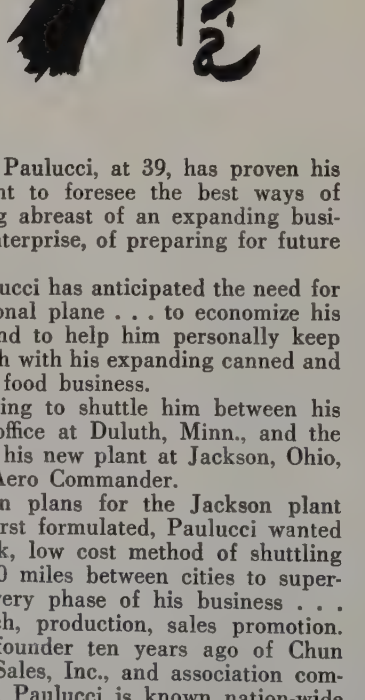
It was NBAA's greatest moment to have been able to award so many business pilots and companies the NBAA Annual Safety Awards. Forty-three "Million-Milers"; eighty-eight "500,000 and over;" representing a total of 115,853,845 miles flown without accident or injury to person, and 42 companies representing 79,716,630 miles.

Your Board of Directors passed a resolution at the September Board Meeting that will extend the same requirements for Pilot Safety Awards and Company Safety Awards to Associate NBAA Members to make them eligible for these awards in 1958.

MAILINGS FOR THE MONTH: Consolidated Listing of CAA's Certificated Stations; Maintenance Bulletin #2; Annual Audit Report; Flight Emergencies in Light Twin-Engine Airplanes and CAA Airworthiness-Directives on Piper PA-22 and Viscount.

AND—A SWEEPING AND HEARTFELT SALUTE TO THE DENVER CONVENTION ARRANGEMENTS COMMITTEE FOR THEIR EXCELLENT WORK IN HELPING TO PUT ON A MOST GLORIOUS AND WORTH-WHILE MEETING.

JENO F. PAULUCCI, *food company president, finds he covers more business ground with his new Aero Commander, purchased prior to opening new Ohio plant. Pilot is Virgil Kordahl.*



Chun King Sales

Jeno Paulucci, at 39, has proven his talent to foresee the best ways of keeping abreast of an expanding business enterprise, of preparing for future needs.

Paulucci has anticipated the need for a personal plane . . . to economize his time and to help him personally keep in touch with his expanding canned and frozen food business.

Waiting to shuttle him between his home office at Duluth, Minn., and the site of his new plant at Jackson, Ohio, is an Aero Commander.

When plans for the Jackson plant were first formulated, Paulucci wanted a quick, low cost method of shuttling the 800 miles between cities to supervise every phase of his business . . . research, production, sales promotion.

As founder ten years ago of Chun King Sales, Inc., and association companies, Paulucci is known nation-wide for his preparation and distribution of canned and frozen American-Oriental and other food products.

The enterprise had its beginnings in northern Minnesota near Duluth. With his new plane, Paulucci is a familiar figure hurrying in and out of Duluth and Jackson airports.

Now that he has his plane, outfitted to suit his particular needs and emblazoned with the oriental motif of his Chun King trademark, Paulucci is already outlining other ways in which he'll use the craft.

He will fly to Florida or California to purchase special recipe ingredients. He'll plane to other points across the nation to introduce his Frozen Bazaar sales unit to groups of dealers, to visit the home offices of supermarket chains; to consult with food brokers.

Paulucci takes personal interest in supervising the quality control of the foods grown for his products. He keeps close watch on the research for better foods prepared in his kitchens.

He has been a forerunner in developing packaging and promotion concepts. The unique Chun King "Divider Pack" recently was granted its own patents.

Now, with his Aero Commander, Jeno Paulucci is planning more time to do his job better than ever.

NBAA Convention Panel Discusses Policies for Company Pilots

Under nine subject headings, a set of company-pilot policies was established at the National Business Aircraft Assn.'s Denver convention.

During a forum titled, "Company Managerial and Operational Policies," a seven-man panel led the discussion. Panelists were Henry W. Boggess, Sinclair Refining Co., moderator; J. H. Winant, Sprague Electric Co.; H. D. Kysor, Aeronautical Consultants and Associates Inc.; M. J. Brown, AMP Inc.; W. R. Dotter, International Harvester Co.; C. A. McKinnon, International Business Machines Corp.; and Don Richardson, Minnesota Mining and Manufacturing Co.

Subjects discussed and their conclusions were:

Pilot authority—he is in absolute command and has the final word;

Operating aircraft without over load —aviation safety is utmost;

Physical examination—first pilots, every six months; second pilots, annually;

Future jobs within the company—when pilot no longer physically able;

Pilot duties—strictly pilot with no cabin duties;

Pilot proficiency—pilot should have semi-annual flight check by CAA;

Minimum qualifications of pilot—including a "clean" airman's certificate and desirable record in relation to accidents, commercial and instrument rating with ATR desirable, 4,800 hours if pilot is to fly plane of more than 12,500 lbs, 2,400 hours if plane is under 12,500 lbs; co-pilots, 600 hours flight time;

Pilot flight time—maximum of 800 hours per year, 75 hours per month, 30 hours in seven days;

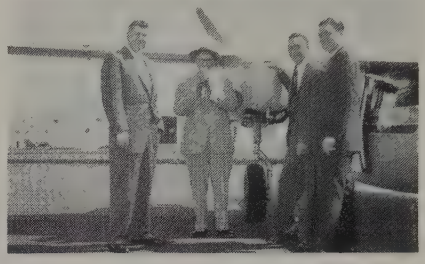
Instrument takeoff limitations—airline sliding scale adopted.

INFLATABLE *survival equipment produced by Air Cruisers Div. of Garrett Corp., includes simplified life preservers (above) and life rafts which meet NAS and CAA specs for any aircraft. Integral with each raft is a survival kit containing flares, rations, first aid and water desalting kits.*

Tower Enroute Control—Region One

The introduction of preferential one-way airways, long range airways, etc., has captured the major publicity in the last few years. Less well known but of at least equal importance to short haul operators, feeder airlines and business aircraft, is the development and rapid spread of the Tower Enroute Control, more familiarly referred to as "Low-Altitude Control". These blocks of airspace, altitude and route segments below the umbrellas of the enroute structure of the Air Route Traffic Control Centers, control of which has been delegated to numerous approach Control Towers, has in many instances, virtually eliminated the crippling delays in short-range IFR flights between many of the points shown on the chart of the northeast U. S.

By means of "Hot-Line" communications between respective towers, short-range flights are "handed-off" from tower to tower, frequently at altitudes vital to the type of aircraft engaged in such operations. Not only is competition for clearance with the long-range "over" flights eliminated, but in many cases altitudes below freezing levels and best suited for possible thunderstorm activity, are available to pilots who would otherwise have had to make extensive detours, accept excessive delay or cancel out altogether. Flight plans for this type of operation are filed directly with the towers involved. Certain of the segments not yet operative are waiting only on the completion of telephone equipment. Examples are CINCINNATI-INDIANAPOLIS, LOUISVILLE-INDIANAPOLIS, BRADLEY/HARTFORD-PROVIDENCE and the Cape Cod area, and BRIDGEPORT-WHITE PLAINS completing the New England to Pennsylvania and WASHINGTON system.



FIRST TO LAND *at new Addison Airport, Dallas, Tex., are, from left, W. D. De Sanders, Addison Board of Directors; Guy Dennis, former airport land owner; Walt Mims, pilot, Delhi-Taylor Oil Co.; Bill White, vice president-general manager, Brown Aero Corp. Airport opened last month.*

Instant Vertical Speed Indicator By Specialties, Inc.

Designed to eliminate the undesirable lag and inaccurate indications of standard R/C indicators is a new rate

of climb instrument manufactured by Specialties, Inc., and merchandised by Continental Development Corp., of Huntington, N.Y.

Described as the first significant improvement in rate of climb instrumentation in 25 years, the IVSI is reported to offer highly accurate indications and steady readability in turbulence.

General News

Approach Clearance Phraseology Changed for Civil, Military Radar Approach Controllers

Recently, a change in approach clearance phraseology, as used by U. S. civil and military radar approach controllers, took place.

1. The outer fixes will be used to feed the final approach path. Aircraft leaving these outer fixes under radar control will be considered on initial approach. Radar vectors and altitude levels assigned between the outer fixes and final approach will be issued as required for spacing and separating aircraft. Example:

(Ident.) Depart (fix), Heading ( ) Maintain (altitude) For a Radar Vector To The (ILS, ADF, VOR, etc.) Final Approach Course.

2. Aircraft shall be cleared for approach at the time the final heading for interception of the final approach course is issued, or after the aircraft is established on final approach course prior to passing the approach fix. Example:

(Ident.) Cleared For (type of approach) Turn (left/right) Heading ( ) to Intercept Final Approach Course Take Over Complete (ILS, VOR, ADF, etc.) Approach, or: (Ident.) Cleared for (type of approach) Take Over Complete (ILS, VOR, ADF, etc.) Approach.

3. Loss of communications. If two-way communication is lost after leaving the outer fix under radar control, the pilot of an arriving aircraft will proceed direct to the ILS outer marker/compass locator, or to an approach facility serving the airport, and execute an instrument approach. The required separation between such aircraft and the other aircraft in the area will be provided on the basis that the aircraft which has experienced the radio failure will effect a landing as soon as possible and radar will be used to control other aircraft accordingly. If the instrument approach can not be successfully completed for any reason (such as weather), the pilot will be expected to comply with any instructions issued previous to radio failure or execute a missed approach. Standard radio failure procedures shall apply in any case of two-way radio communications failure other than those outlined in this paragraph.

Lockheed Tests Allison Turboprop on Constellation

Lockheed is testing a newer and bigger Connie with Allison 501 turboprop engines (which will be used for the Electra). Lockheed officials came up with a nifty name for the combination aircraft of the Electra and the Constellation. They call it the "Elation." The word is that the new Connie can land on a piece of paper and carry a handful of tanks.

Hiller Runs Lycoming Engine 750 Continuous Hours

Hiller Helicopters, Palo Alto, Calif., tested a Lycoming 250 hp engine plant. It operated continuously for 750 hours.

Hiller said the engine could have run longer. Lycoming said that no other engine has ever approached the 750 mark.

W. H. Conrad Flies Twin Beech 980 Miles In Under 4 Hours

The aircraft, Twin Beech D18S, which W. H. Conrad, flew 980 miles from Fort Lauderdale, Fla., to Shreveport, La., block to block and used a bare four hours and 57 minutes in the nonstop flight plus a scant 214 gallons of petrol, was at the NBAA Convention at Denver.

Bill Conrad attributed the performance to an Airline Safety Performance Safety Kit he had installed.

ALPA's "Basic T" Instrument Panel Becomes CAR

The Air Line Pilots Association "Basic T" instrument panel has become a Civil Air Regulation as of October 17.

As adopted, the regulation specifies a standard position on the instrument panel to present basic information as to air speed, altitude, attitude and direction. These instruments will be grouped on the instrument panel and centered as nearly as possible about the vertical plane of the pilot's forward vision in this relative order: ATTITUDE top center; AIR SPEED adjacent to and directly to left of top center; ALTITUDE adjacent to and directly to right of top center; DIRECTION adjacent to and directly below top center.

This regulation is fast becoming an international one for its many advantages have been recognized and sought:

1. In all operations, accurate, rapid interpretation of basic flight information during instrument landings and restricted visibility takeoffs.

2. In interchanges of equipment, from light twins to heavier twins, provision of a thoroughly familiar visual pattern eliminating the strain of switching from one type of instrumentation to another.

3. In National Defense, instrument standardization between military and commercial aircraft, facilitates the transition.

If the hoped-for adoption as a worldwide standard is achieved and the "Basic T" becomes primary in aircraft production, business pilots everywhere will be using the same instrument arrangement without constant retraining and familiarization under critical conditions.

Aircraft Radio Communication, Navigation Equipment Made Prominent, Popular Displays At Denver Exhibit Hall

LEARCAL DIVISION, *Lear, Inc., is discussed by P. O. Momenteller, right, of the Santa Monica, Calif., firm, with Jim Wells, left, sales manager, Howard Aero, San Antonio, Tex., and Grant Robertson, vice president, Clinton Aviation, Denver, Colo.*

ADMIRING THE MERCHANDISE *are Arthur W. Templeton, left, of Southern Airways Co., Atlanta, Ga., and Orin (Moose) Redhead, district sales manager, Wilcox Electric Co., Kansas City, Mo.*

COLLINS RADIO DISPLAY *proves interesting to, from left, Dave Cuckler, Cuckler Mfg. Co.; E. B. Jeppesen, president, Jeppesen & Co., Denver, Colo.; R. C. Christie, Collins Radio Co., Cedar Rapids, Ia., Ken H. Skinner, Jeppesen & Co.; and C. L. Pfiffer, Collins Radio Co.*

Aviation Enterprises Getting Small Business Loans, CAA Says

Small Business Administration has granted more than half the requests for loans from General Aviation business, the SBA reported to the Civil Aeronautics Administration.

A year ago, James T. Pyle, CAA Administrator, pointed out that the loans were available under certain circumstances for hangars, shops, classrooms and similar aeronautical purposes.

As of July 31, 1957, 61 General Aviation applications were received requesting $2,729,467. Seven of these were later withdrawn. Twenty-seven applications were approved for $1,212,293 and 24 involving $1,053,235 were declined. Three applications totaling $211,500 were pending.

Almost half of the total funds were for seven hangar projects. Many of the other loans were to provide working capital to pay off bank loans and taxes, thus placing the operators in a better position to finance their own hangar construction.

Southern Illinois Airport Is New Name For Former Murdale

A change in names to Southern Illinois Airport was done to more adequately describe the area served as well as the airport location, C. Gene Seibert, field manager, said.

The airport recently extended the Northeast-Southwest runway to 5,100 feet and added truck gassing, fire and crash protection facilities.

Services include weather station, restaurant, maintenance and radio shops. The airport is located three miles NNW of Carbondale, Ill. It's on the Nashville chart.

The new runway length, increases large plane operations safety.

CAA Gets Computer From Canadian Government

An agreement under which the Civil Aeronautics Administration has leased at a dollar per year for 15 years a giant electronics computer from the Canadian Department of Transport for use as a dynamic operational air traffic control simulator, was announced by James T. Pyle, CAA administrator.

The computer, costing $5,500,000 and originally designed for use as a military tactical trainer, is being converted for use in the study of day-to-day air traffic control problems in line with the recommendation of former Presidential Assistant Edward P. Curtis as to enlargement of CAA simulation facilities. It will be used also to provide an expeditious, safe and fully operational method of air traffic experimentation.

CAA and Department of Transport engineers, with assistance of Franklin Institute Laboratories, are conducting a design study on the computer to determine the best modification plan for air traffic control simulator use.

Bendix ADF Units Ordered for Caravelle

Dual automatic direction-finding equipment developed by the radio division of Bendix Aviation Corp., has been specified by Air France for installation on its new fleet of Caravelle transports. The sleek twin-jet medium-range passenger plane is a potential bidder in the corporate plane field.

The Bendix equipment, the DFA-70 unit, provides automatic visual presentation of the direction a plane is heading in relation to a transmitting station and reception of audio signals from radio ranges and other navigational aids.

The airline's "fleet order" placed with Bendix also includes a new ferromagnetic ADF antenna, the LPA-70, which is specially designed for flush mounting in modern, high-speed aircraft.

The Bendix systems will be installed at the Sud Aviation plant, Toulouse, France, where the Caravelle is in production.

CAA Announces Standards For Privately Owned Radio Ranges

Requirements for the installation, performance and maintenance of non-Federal very high frequency omnidirectional radio ranges (VOR) have been established by the Civil Aeronautics Administration, U. S. Department of Commerce.

The policy regarding the operation of non-Federal VOR facilities is stated in CAA Technical Standard Order N27 and is mandatory on all CAA employees "in their discussions, advice and recommendations to the public, or in their approval of the use of this type facility in any CAA-approved air operation or procedure."

TSO N27 was prepared in order to standardize the installation, operation and maintenance of privately owned VOR facilities with those operated by State aviation organizations.

Air Pollution Deters Aircraft Service, Says Convention Paper

The effects of air pollution on airport visibility have become such that "the continuation of conditions affecting the metropolitan airports of New York City (in particular) is incompatible with the need for safe, rapid and continuous service to the area."

In expressing this warning, a paper before the American Society of Civil Engineers' convention at New York City last month, went to say that "Until improvement in airport visibility is achieved, flights must depend on instrument flying during periods of critical visibility."

These views were presented by William T. Ingram, adjunct professor, and Louis C. McCabe, consultant, research division, both of New York University.

Vickers Viscount Among Best Selling Commercial Aircraft

Increasing demands for British made aircraft, have increased production of the Vickers Viscount turbo-prop airplane.

Figures for the first three-quarters of 1957 show that the Viscount is among the world's best selling aircraft. The average rate-of-build during the period has been ten Viscounts per month. Total Viscounts delivered to date is 235. Total sales is 374.

Forty-six operators in 31 countries have placed orders for the Viscount, which is operated for corporation flying as well as for airline work.

Viscounts are produced at two Vickers Armstrongs (Aircraft) Ltd. factories where six separate assembly lines, totaling more than one mile in length, are maintained.

GETTING IN COSTUME *for Pick 'n Shovel Party at NBAA's Denver, Colo., confab.*

Mrs. Rick McCoy gets a touch of local color with the aid of Bill Mills, NBAA convention committee member, for the Colorado hospitality night. Mrs. McCoy's husband, Rick, is at her left in the photo above. The party featured Colorado's "fabulous mining days," recreated in "authentic style."

Dallas High School Science Classes Get Engineer Teachers

An unusual experiment, one of the first of its kind in the nation, is giving students in four Dallas-area high schools a better chance to become tomorrow's scientists.

Their physics teachers are practicing engineers. After teaching one class each day, the engineers go back to their work at Temco Aircraft Corp.

Cognizant of the nation-wide shortage of engineers, Temco officials decided that the solution might lie at the high school level. They discovered that high schools at Duncanville, Cedar Hill, DeSota and Seagoville did not offer physics courses because qualified teachers were not available.

On a nation wide basis there is little Temco or any other single company can do to develop more engineers. But, nearer home, maybe one company could at least make a start. This was Temco's thinking.

With the "do it yourself" thought in mind, Temco decided to provide part-time instructors for the four schools. The engineer instructors commute to school each day, teach a class, then return to their jobs.

They represent a total of 108 credit hours of physics at the college level, plus many years of practical experience in aircraft engineering fields.

Nearly 100 Dallas County students signed up for the courses taught by Frederic Lee Watts at Duncanville, Ronald D. Chapman at Seagoville, F. A. Lehman at DeSoto and H. X. Brown at Cedar Hill.

Agricultural Flying Survey Made By National Aviation Trades Assn.

Scope of the average aerial applicating business of 1956 was obtained in a survey made by the Agricultural Activities Division of the NATA, Washington, D. C.

The survey covered "about one in every 15 applicators and brought returns from 30 of the most active agricultural states."

The average applicator of 1956 showed up as having a capital investment of $48,000 with an income of $58,400. His revenue flying totaled 761 hours for the year and was accomplished in 5.2 months of operation. In this period he treated slightly more than 57,000 acres, and 9.2 persons were utilized through either full or part-time employment.

In spraying operations, including concentrate and carrier, 68,300 gallons were put out, while total powder dust distributed was found to average 367,-510 lbs. per operator.

Spraying outran dusting in acres covered by four to one, with fertilizing next.

More than half of the reporting operators showed that their total business was entirely, or nearly so, from aerial applicator activity. It was learned that many business heads flew agricultural work themselves.

Maintenance Bulletin

These maintenance notes are compiled and edited from recent CAA air carrier maintenance branch and general aviation maintenance summaries, and mailed to NBAA members as part of their membership service.

AERO COMMANDER

Model 520

Bungee Assembly P/N-143-33160-3—Nose gear collapsed when moving aircraft out of hangar. Investigation disclosed that the center shaft which extends through the spring type bungee was broken, allowing the spring to double up.

Model 680

Fuel Cell Interconnector—Fuel fumes were evident in the baggage compartment. Inspection disclosed forward interconnector from right rear cell to center cell was damaged, apparently resulting from clamp being installed adjacent to the reinforced area.

Axle—Left axle failed when making left turn and applying brakes. On inspection, it was disclosed that the failed axle was counterbored 1½" deeper than the corresponding right axle. Measurement can be made by removing the welsh plug and depth gauging with a length of wire.

Housing Assembly—Inspection disclosed circumferential crack developing in casting neck, where bottom of upper flange attaches to neck.

BEECHCRAFT

Model D-18-S

Fuselage Fuel Line P/N-407-189686LH-P/N-407-189731RH—Fuselage fuel line (crossfeed suction line) directly under battery box brackets was found leaking. Inspection disclosed that the hot air heat duct routed to cockpit and defroster was chafing the fuel line.

Model E-18-S

Flaps (wing)—Inspection disclosed cherry rivets shearing at trailing edge of flaps. These rivets secure the lower skin.

Model A-35

Engine Mount Casting—P/N-40759—Right front casting failed through "I" section. Inspection disclosed evidence of a progressive crack.

Model H-35

Oil Pressure Line—The vacuum pump oil separator line chafed through the oil pressure line resulting in loss of oil.

Cockpit Propeller Control—Subject control separated at joint in back of lock nut that retains plastic knob. The connection that separated is made up of a brass splined boss which is pressed into a steel housing. Suggest inspection of connection for any indication of movement.

Starter-Primary Power Cable—The subject power cable supplying current to starter from solenoid failed at the attachment lug (solenoid end). Operator reports installing a longer cable to better compensate for engine vibration.

Model D-50

Carburetor Air Filter Door, P/N-50-970023—Subject door failed in area of spot welds. In addition, the air door arm assemblies were worn excessively where they pass through the needle bearings.

Model E-50

Roll Pin—Carburetor Heat Valve Control—Excessive wear has been experienced involving the roll pin in the carburetor heat valve control arm. Beech Service Bulletin E50-8 was complied with; however, in this particular case the extent of wear was so great that the roll pin slipped through the safety wire fix.

BELL HELICOPTER

Model 47G

Gauge Assembly—Oil Level P/N-18120—Instances have been reported of the oil quantity dip stick failing at attachment point to cap.

Control Rod Assembly P/N-47-150-009-3—The control rods, which link the main rotor pitch control assembly to main rotor mast stabilizer assembly, were cracked in the rivet area of the rod ends.

Model 47-J

Blade Bumper Assembly P/N-47-120-2475—Subject assembly "froze" in the high RPM position, resulting in the main rotor blades contacting the tail boom at low rotor RPM. Inspection disclosed rust on bolt (Bell P/N-AN176-27) "froze" bolt to bumper arm bushing to the extent that the return spring could not return assembly to low RPM position. Since there are no external means for lubrication, operator reports periodically removing, cleaning, and greasing bolts to prevent recurrence of the above condition.

CESSNA

Model 172

Carburetor Heat Duct—Inspection disclosed subject part had to be replaced because the portion in proximity of the heat muff was deteriorated due to excessive heat.

Model 180

Fuel Line—The flap and rudder cables were found chafing the fuel line aft of fuel selector valve. Cessna Service Letter 180/182-17 covers inspection.

Model 182

Carburetor Heat Box—Inspection disclosed that the rivets which hold the subject part to the mounting flange were loose, attributed to elongation of the heat box metal.

Line-Oil Pressure (engine to firewall) P/N-0500106-106—The oil pressure line was chafed through at the clamp which retains line at the firewall.

Model 310

Landing Gear Warning Light System—Difficulty was encountered, attributed to malfunctioning of the gear warning light system. Investigative findings indicated the cause for the "green" gear down light not coming "on" was a film of oil and dirt between the stops of the bellcrank assembly, P/N-084-1225-1, and link-side brace stop, P/N-0841100-1, on the left main gear. This, coupled with the switch plunger which had extremely short travel, resulted in the aforesaid incident.

Reverse Current Relay—Subject relay, which is installed under the right front seat, was short circuited by the heater duct. Investigation disclosed duct reinforcing wire chafed through rubber booted metal posts on relay.

CONVAIR

Model 240

Pilot reported that when throttles were put into the reverse quadrant on landing, aircraft deceleration was not noticed. Immediately moved throttles to idle position and applied brakes. Over-ran runway approximately 150'. Aircraft was not damaged. Returned for inspection. Reverse switch rigging and system checked. Functional checking on runway revealed that it was possible to get one propeller in reverse and other in forward pitch after numerous attempts by manipulating the "Tee" handles. Reverse indicating lights indicated the discrepancy. Reverse switch rigging under investigation. Electrical wiring rework under consideration. Pilot bulletin issued to extend steady pull to "Tee" handles until reverse lights are on.

Model 240

Declared an emergency and overflow Rochester, N.Y. account lost all hydraulic fluid. On landing and after propellers unreversed aircraft started to veer off runway. Applied emergency air. All main gear tires blew. Inspection revealed right hand nose steering cable had sawed hole in hydraulic line located under flight deck step. Line runs between landing gear selector valve and reservoir. Cable was found misrouted on top of line. One gear wheel damaged. Changed all main gear tires and wheels, damaged hydraulic line and both engine driven hydraulic pumps.

Inboard and center fuel tank access plates doublers of left and right wings cracked. Cracks followed curved contour of wing skin cutout on inboard ends of doublers where Fairprene seal was trimmed with knife cutting deep gouge into doubler. One inboard doubler also had chordwise cracks at end rivet of non-continuous stringers. CV-340 type doublers installed.

Model 440

During training flight the air bottle was used to release landing gear uplocks. Right main gear uplock did not release. A nut on the emergency uplock release line AN fitting in fuselage aft of lower cargo compartment was loose.

Airplane TT 510:00 hours. Campaign was immediately started to check operation of emergency uplock air system. To date nuts have been found loose on the line AN fittings on 8 airplanes. Six airplanes checked OK.

St. Petersburg, Fla. Landed during rain storm and encountered water on runway. Water caused minor dents and wrinkles in both inboard landing gear doors, both inboard wing flaps, the left wing to fuselage fairing and lower fuselage skin at station 109. Also damaged left lower aft nacelle cone and left hydraulic and air brake which are routed through the cone aft of rear spar. Distortion of air and hydraulic brake lines indicate possibility of puncturing or collapsing lines when rear cone is damaged.

CURTISS-WRIGHT

Model C-46

Following takeoff No. 2 engine temperature went to 110° and oil pressure dropped to 40 psi. Supplemental Report. Rear master rod failed due to oil starvation. In checking main oil screens the outer screen was proper type but inner screen was of Dutch weave type. This screen is not recommended as it cannot be cleaned to flow oil through freely causing oil starvation. Fleet campaigned to check screens in service. Also, stock being checked to discard improper screen.

Model C-46

During preflight inspection, found left elevator, P/N 20-130-5701-512, cracked at Station 30 and 38 where torque tube attached. Rib Station 30 and 38A had previously been reinforced and crack found in reinforcement area. Upon removal of elevator, torque tube found to be misaligned.

This refers to a report that after takeoff, oil pressure low, high head temperature, low oil quantity. No. 2 engine feathered. Investigation revealed 2 diagonal cracks in propeller shaft approximately 3" long permitting loss of oil through shaft. Cause unknown. Shaft will be replaced.

DEHAVILLAND

Model 104

Breather Pipe (Gipsy Queen) 70-4MK2—Oil was observed exhausting in right flap area. Investigation disclosed breather pipe clamp had come loose, allowing the breather end to assume a position crossways to the air flow through the engine compartment.

Heron 2A

Boost Pump Switch P/N-5CW-4836—Subject switch was inoperative. Upon disassembly of switch, the one contact retaining screw backed out, allowing the contact to drop free. Operator reports installing star lock washers under retaining screws.

DOUGLAS

Model DC3

Aileron Hinge Bracket P/N-4115291—Both lower angles of the subject brackets were found cracked just aft of the trailing edge of the wing.

Left landing gear would not extend. Flight recalled to St. Louis account better emergency facilities. On fourth extension both gears operated normally. Normal landing accomplished. Inspection revealed AN50.9-1032 screw binding slide assembly, P/N12.094.-1001-6, in track assembly, P/N12.094.-1101-1, of gear doors due to wear of counter sink hole in aluminum track assembly allowing AN032 screw to stack up and catch slide mechanism. Manufacturer of gear doors notified.

Immediately after takeoff, detected fire coming from left engine. On final approach, returning to field left engine quit. Air time :10, identification of part, Pesco fuel pump, P/N 2P-R-600, relief valve, P/N R-600-89F. TSO :40. Investigation revealed defect in manufacture of relief valve. Relief valve end had broken. Spring abutting end of part was only .012" thick. This part failed after :40 of flight time permitting raw fuel to enter altitude chamber and subsequently flow overboard through vent line apparently into the exhaust stream. No fire damage to aircraft.

Encountered bird strike en route Menominee, Mich., causing glass fragments to enter captain's eyes. Flight returned to Green Bay. Windshield replaced. More bird resistant windshield being incorporated.

While running upper cylinder lube through right engine experienced exhaust fire which damaged right outboard nacelle fairing and minor damage to wing skin. Instructions have been issued forbidding use of upper cylinder lube.

Feathered right propeller due to fire warning. Inspection revealed defective Wilcolator unit. Replaced unit. Presently service testing Edison type system on possible conversion.

Model DC-3A

Aborted takeoff account oil pressure drop No. 2 engine. Returned to ramp. Inspection revealed cleaning rag in oil tank blocking oil supply to engine. Removed rag. Ground check OK. Returned to service.

Model DC-3-C

On turnaround inspection, noticed right landing gear upper truss bolt head had been turning in truss, rounding off bolt head. Bolt, P/N 1117078. Further inspection revealed bolt had frozen in bushing thereby causing bolt and bushing to turn. Bushing, P/N 1117830. Bolt to bushing had no clearance, reference Douglas Service Bulletin dated September 1948. New bolt and bushings installed.

GRUMMAN

Model G73

Nose strut Barrel P/N-69633—Magnetic particle inspection indicated crack at junction of weld, which joins strut support trunnion to barrel (lower surface of support joint).

LOCKHEED

Model 18

Aileron Control Retaining Screw—The 8/32" screw, which attaches the end of the aileron control chain to the link, P/N-166193, was found in a near-failed condition.

NAVION

Model Series

Main Landing Gear Actuating Strut Support P/N-143-33153—Difficulty was encountered on attempting to lower the landing gear. Inspection disclosed the subject support separated in proximity of the cotter pin hole.

PIPER

Model PA-22

Engine Mount Bushings—Damage to the nose gear tire was incurred, resulting from contact with the propeller. Investigative findings disclosed that the engine mount bushings were worn to an extent that the engine case was resting on the bolts.

Fuel Tank Caps—We are in receipt of information indicating there may be some subject aircraft having automotive type gas caps installed. The general appearance of the automotive and aircraft fuel caps are similar; however, the automotive type cap is not vented. Obviously, with this type cap installed on aircraft, continued safe flight would be questionable.

Exhaust Flange Nut and Gasket—A recent fire in flight was attributed to a blown left rear cylinder exhaust gasket. Recent reports disclose that on inspection the exhaust flange hold-down nuts were found in varying degrees of looseness.

Fuel Tank Finger Strainer Fitting—Reports have described cracks in the subject fittings, resulting in fuel leakage.

Landing Gear "V's" P/N-13016-00 P/N-13016-01 — Inspection disclosed crack at the upper end of streamlined strut, at corner of front gusset plate on right and left landing gear "V's."

Nose Wheel Steering Arm P/N-13107-00—The threaded stud on the front end of the rod failed at the base of the threads. Inspection indicated a progressive condition.

Model PA-23

Elevator Push-Pull Tube—Unsatisfactory service has been experienced when utilizing the nylon blocks required when complying with AD-57-5-3. Accelerated wear of the subject tube is believed aggravated by the nylon block.

Heater System Valve Assembly P/N-753-101—Several instances have been reported of fuel leaking at the circumference of the parting surface of the subject valve. Insulation material in the nose compartment of the aircraft, directly below the valve mounting position, was saturated with fuel.

Belly Inspection Pan—Inspection disclosed elevator control torque tube rubbing on fiberglass insulation on belly access plan.

Fuel Pumps (2) Electric Auxiliary Bendix Model 476087—Inspection disclosed subject pumps had developed leaks at the circumference of the "rolled" edge at the top of the pump assembly (fuel outlet end of pump).

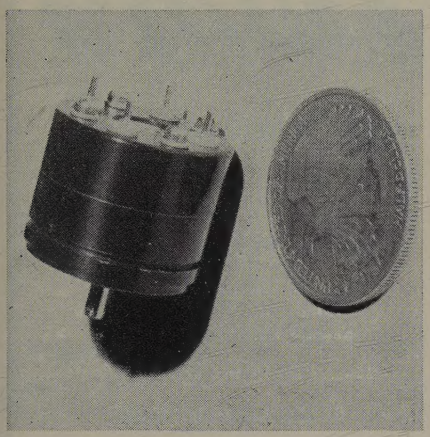
GENERAL

Fabric deterioration will vary, when exposed to the same conditions, in areas of different colors. Test both light and dark painted areas at inspection.

NU-AVI-QUIP

Smallest Microsyn Available

Lear, Inc., is manufacturing the smallest self-contained microsyn available. Approximately one inch in diameter and one inch long, the units have a sensitivity of 500 millivolts per degree with a threshold of 0.01 degree at 20V excitation. Linearity is within 0.5% to seven degrees. The subminiature microsyn weighs less than 1.2 ounces.



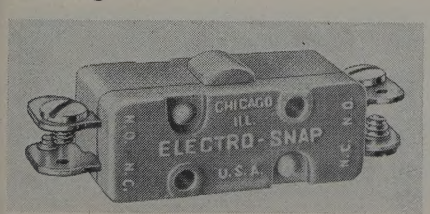
Intended for use wherever there is need for accurate transulation of angular displacement into electrical signals, the miniature units may be used in such applications as position indication of gyros, control follow up devices, computation, process control, motion and torque amplification, etc.

The company produces the microsyns with pigtail connectors or with color-coded teflon-insulated terminals.

Excitation may be 20V, 400 cps or 25V, 800 cps. The units use standard BuOrd mounting and have demonstrated resistance to the most severe environmental conditions. Address inquiries to A. B. Anderson, Lear, Inc., 110 Ionia Ave., NW, Grand Rapids 2, Mich.

Snap Switch

The new basic snap switch S9-4 provides precision tolerances in an ambient temperature range of minus 100 degrees to plus 900 degrees F. The ceramic case contains the standard Electro Snap switch mechanism for Single Pole, Double Throw two circuit electrical control with a probable mechanical life of 750,000 cycles of operation. The staggered screw terminals, made of stainless steel, permit easy wiring. The switch case measures 1¼ inches long with standard .101 diameter mounting holes.



Long Handle Screw Driver Holds Screw For Assembler

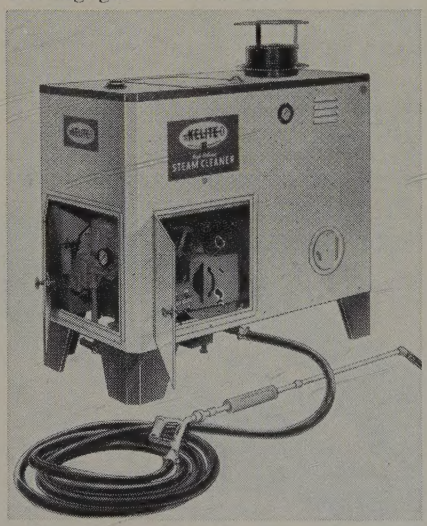
A screw-holding screw driver, produced by the H.J.J. Co., Oakland, Calif., provides a quick, sure way to hold a screw in position. As the assembler pushes forward, tiny twin bits expand inside the slot of the screw. The screw will not be released until it is firmly seated in the thread. It is manufactured in a range of sizes and lengths to suit every requirement.

New Series of Steam Cleaners For Medium And Heavy Duty

A new 3-model series of steam cleaners has been announced by Kelite Corp.

The Mark I, designed for light to medium duty, has an output of 120 gph. Mark II, for medium/heavy duty, has a 200 gph output. The Mark III, with a 300 gph output, is designed for maximum duty. The output of all three cleaners is rated at 320° F.

Other advantages of the new cleaners are reported to be: positive displacement piston pump to deliver full rated output several hundred feet from the machine; water-wall heat exchanger for increased fuel economy; and an instant starting gas or oil burner.



Standard equipment for any model includes a cleaning gun, spray nozzle and heavy-duty hose. Available options include nozzle control for gas-fired models, trainer or caster mounting for oil-fired models, flat nozzle and flat nozzle kit, and extra heavy duty wire-braided hose.

New Aluminum Cleaner

A new aluminum cleaner aided by finely ground, high quality aluminum in its formulation, cleans and removes streaks and spots as well as leaves a satin finish and protective coating.

Rap's Aluminum Cleaner may be used on other metals but is designed specially for aluminum.

(Continued on page 76)

SKYMART

the Market Place for Aircraft Parts, Equipment, and Services

SALE OR LEASE

ROYAL GULL AMPHIBIAN
EXECUTIVE de HAVILLAND DOVE
EXECUTIVE LOCKHEED LODESTAR
GRUMMAN SUPER WIDGEON

TIMMINS AVIATION LIMITED
Montreal Airport
TAL

Advertising Rates Skymart Section

$17.00 per column inch for one to five issues, $16.00 per column inch for six to eleven issues, $14.00 per column inch for 12 issues on contract basis.

Full particulars on request.

SKYWAYS
425 Fourth Ave., N. Y. 16, N. Y.

The **FINEST** in Aircraft Radio

QUALITRON INCORPORATED

AIRCRAFT RADIO | Engineering Installation Maintenance

Distributor For

A.R.C. • BENDIX • COLLINS

Specialists
Executive Aircraft Radio Systems
Custom Edge-lighted Panels

Lockheed Air Terminal—at P.A.C.

BURBANK, CALIFORNIA

St. 7-9472 St. 7-5963

*C.A.A. Repair Station No. 4083
Radio Class 1, 2 & Limited Radar

GRAUBART AVIATION

HERE ARE EXAMPLES OF SOME FINE AIRCRAFT IN OUR STORE

Three 1957 PIPER TRI PACERS ... Beaut's ... from ..... $ 6,950.00
1957 Piper Super Cub ... would list out at $8,700.00 ..... $ 6,750.00
Two 1956 CESSNA 172's ... 350 hrs TTA&E—525 hrs TTA&E ... from $ 7,495.00
1953 CESSNA 195A ... 245 HP ... real doll! ..... $ 7,950.00
1955 AMPHIBIOUS CESSNA 180 ... Zero time Fac. Reman. Engine ... $15,900.00
Two Cessna 180's, '54 and '55 ... $7,950.00 and ..... $ 8,950.00
1957 CESSNA 182—Like brand new . $13,900.00
NAVIONS GALORE—225HP and 260's From ..... $ 7,950.00
Eleven BONANZA's ... terrific buys From ..... $ 6,950.00

EXECUTIVE TWINS

1955 APACHE SUPER CUSTOM ... Terrific Buy $23,900.00
1956 SUPER CUSTOM APACHE ... 300 hrs TT—Loaded $25,900.00
1957 SUPER CUSTOM APACHE ... Like New $29,500.00
1957 SUPER CUSTOM APACHE ... LOADED TO THE HILT, HAS EVERY-THING, INCLUDING L-2 AUTO PILOT with altitude control and ap-proach coupler $44,900.00
AERO COMMANDER 520 ... 1200 hrs TT RE: Zero Time-LE:270 hrs $32,900.00
AERO COMMANDER 560 ... 690, 7 Place with Zero Engine $49,500.00
Two 1956 TWIN CAMAIRS ... Like New ... From $22,900.00
1956 CESSNA 310 ... 350 hours TTA&E $48,900.00
TWIN BEECH ... 540 SMOH on LE 577 hrs SMOH on RE by Gopher Aviation $12,900.00
D-18S TWIN BEECH ... Most beauti-ful we've ever seen at this price .. $38,900.00

Our Experience Makes Representation for Good Aircraft and Low Prices . . . Your Comparison Will Prove It.

Write or Call Today for More Information.

GRAUBART AVIATION, INC.
540 N. Lake Shore Drive
Chicago 11, Illinois
MOhawk 4-6260

NAVCO Inc.

Lambert Field
St. Louis, Mo.
PErshing 1-1710

$1,000,000 in Active Parts for Executive Aircraft

Douglas	Airframe Parts	Pratt & Whitney
Beechcraft	Engine Parts	Continental
Lockheed	Standard Parts	Wright
A.R.C.	Sperry	Accessories
Bendix	R.C.A.	Instruments
Collins	Wilcox	Deicers, Tires

AIREX Service

INTERIORS

HORTON-HORTON

EXCLUSIVELY

Meacham Field Fort Worth

$500,000.00 CASH

For Airplanes

We'll spend this each month for clean lite twins & single engine or complete dealers stocks new or used. We pick up — no red tape.

VEST AIRCRAFT CO.
Sky Ranch Airport
EMpire 6-2663
Box 5306
Denver 17, Colorado

SINCE 1937 **Page AIRWAYS, Inc.**

FINEST AIRCRAFT MAINTENANCE

100 HR. INSPECTIONS
COMPLETE OVERHAUL

TWIN BEECH
DC-3
LODESTAR

ROCHESTER AIRPORT
PHONE GENESEE 8-7301 • ROCHESTER 11, N.Y.

SERVING THE INDUSTRY AS SUPPLIERS OF DOUGLAS PARTS AND COMPONENTS

FARRAR AVIATION
WE SOLICIT OPEN ACCOUNTS FROM WELL-RATED FIRMS

One of the world's largest inventories of
DOUGLAS DC-3 & DC-4 PARTS

325 WEST MAIN STREET P. O. BOX 113 ONTARIO, CALIF. YUkon 6-6746 CABLE ADDRESS "FARRAIR"

FARRAR AVIATION WUX
State Dept. Export Reg. No. 4528

General News

U.S. Army Aviation Branch Promotes Light Plane Business

What the Army aviation branch demands is lighter planes operating on shorter takeoffs and landings runs with greater dependability in all kinds of weather. These are the very factors which corporate owners are looking for in addition to speed.

By 1960, says Col. G. P. Seneff, of Army's Aviation research and development staff, the Army hopes to replace all aircraft it now has in service with new and better equipment.

If this is true, the U. S. Army may force a big boom in light twins and smaller single-engine aircraft for the corporate field.

This should provide money for research and a chance to cut down on production costs to a point where the business "flivver" might come into being.

Radio TV Station Increases Sales, Speeds News with Airplane

Increased sales and improved news coverage has resulted in more than paying for a Cessna 310 during its first year of operation, says Charles H. Crutchfield, executive vice-president and general manager of Jefferson Standard Broadcasting Co., Charlotte, N.C.

The broadcasting firm operates three stations. The airplane is available on a 24-hour basis to the sales staff of the three stations.

The company's news staff utilizes the plane when such missions do not conflict with pre-arranged sales trips. Reporters and cameramen frequently fly for on the scene news coverage.

Concern Over Civil Air Regulations Changes Expressed by General Aviation Planning Group

"General aviation is deeply concerned and genuinely alarmed over pending proposed changes to Part 60 of the CAR," says Dr. Leslie A. Bryan, chairman of the General Aviation Facilities Planning Group, "particularly over a proposal that ceiling and visibility minimums in controlled air space be increased."

Dr. Bryan said that the Group has written a letter to the CAB on the subject. He emphasizes the cross-sectional character of the Group which "includes representatives in its membership from every segment of general aviation and with individuals and organizations associated with its member association located in every section of the country."

In addition to Dr. Bryan, the Group executive committee includes Dwight P. Joyce, Glidden Co. president and chairman; Dwane L. Wallace, Cessna Aircraft Co. president; and George E. Haddaway, aviation magazine publisher and Group's original general chairman.

CLASSIFIED ADVERTISING

Rates for Undisplayed Classified Advertising: 30¢ per word, minimum charge first 10 words $3.00, prepaid with order. Add 4 words if Box Number is included in lieu of advertiser's name and address.

AERONAUTICAL BOOKS

FREE CATALOG (1957) of leading aviation supplies including Zweng Books, Navigation Computers, Plotters, Log Books, etc. Also maps and charts; Books of the Sea and Air. Nautical supplies and general technical books on all subjects. Pan American Navigation Service, 12021-22 Venture Blvd., N. Hollywood, Calif.

AIRCRAFT FOR SALE

1957 CESSNA 310. 139 Total hours by Recorder (not guess time). One pilot not a demonstrator. Auxiliary Tanks; Auto Pilot; Alt. Control; Approach Coupler; LVTR-36; ARC-T-21; Dual ARC-15D OMNI'S; Marker Beacon (2200) ADF; R89 Glde.; Slope Filtronics Amplifier; Beacon Lite, Plus Misc. Replacement cost, $82,000.00, my price $65,-000.00 (might trade) Ed Tobey, 704 W. Kessler, Indianapolis, Indiana. Phone CLifford 1-2070.

CHARTS & MAPS

AVIATION Charts now available from our new Chart Division. Agents for the Coast and Geodetic Survey. Our service includes Aeronautical Sectional, World Aeronautical, Direction Finding Navigational Flight, etc. Distributors for New Plastic Relief Map of the United States $45.00 express prepaid. (Free Catalog.) Pan American Navigation Service, 12021-22 Venture Blvd., Hollywood, Calif.

METAL CONVERSIONS

SICK with fabric headaches? Fed up with 100% depreciation? End all this with a SKY-CRAFT DESIGN All-metal conversion. No screws, no rib stitching, no kits, no risk. You get flight-proven, durable Aluminum Alclad. Riveted rigid, strong, smooth and good-looking. CAA-STC approved. Hundreds of completed conversion. Want names of satisfied owners? They paid only $350 for ERCOUP wings (new thicker leading edge), 2-hr. exchange; CESSNA 120-140 wings only $395, 5-hr. exchange; Stinson-108 wings $595, fuselage $695, both $1195. All prices installed Now's a good time. Skycraft Design, Dept. S, Old Star Airport, Langhorne, Penna. WIndsor 5-7750.

POSITIONS WANTED

CO-PILOT-MECHANIC position wanted. Ten years A & E. Commerical pilot, instrument. Curtis Cleland, 1211 Division, Napa, Calif.

RETIRED AF OFFICER with ATR and over 11,000 hours desires position as professional pilot with Company or individual owner in Denver area. S&MEL ratings with Command experience in most everything including Lockheed Constellations. Available immediately. P. O. Box 215 Colorado Springs, Colorado.

MISCELLANEOUS

$2.00 can save you hundreds. It's NEW! ! ! Now you can receive information each month on hundreds of aircraft for sale throughout the United States. At a glance you will know what is available, hours, date licensed, price, etc., of practically every type of airplane manufactured. We tell you who owns the aircraft and you deal direct, saving time, eliminating hours of travel, and by knowing the market you get the best deal possible. You can receive your first copy listing aircraft for sale IMMEDIATELY DON'T WAIT!! Send $2.00 TODAY of a full years subscription. Flyer's Market published by Aircraft Listing Bureau, 5305 Congress St., Chicago 16, Ill.

SURVIVAL FOOD—Have you heard of Van Brode's "Arctic Trail Emergency Food Carton"? It is a Stowaway Carton and contains 4 Key-opening tins of emergency foods plus "tuck-in" survival items. Each tin provides emergency food for 1 person for 1 day in a cold environment. Price $10.00 Postpaid in U.S.A. Also available—"Tropical Trail Emergency Food Carton" $8.50 and "Robinson Crusoe Emergency Food Carton" $7.00.—Van Brode Milling Co., Inc., Clinton, Mass.

BINOCULARS REPAIRED, all makes. Free estimates. Authorized Bausch Lomb, Zeiss, Hensoldt, Bushnell dealer. Tele-Optics, 5514 Lawrence, Chicago 30, Illinois.

NU-AVI-QUIP

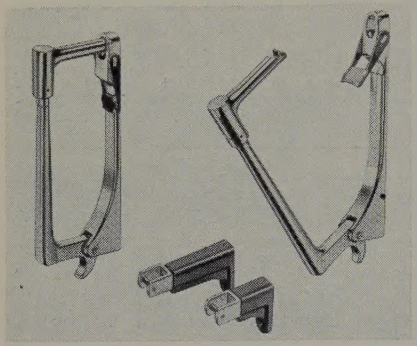
(Continued from page 71)

Multi-Purpose Latch for Electronic Chassis

A new multi-purpose latch has been especially designed for use on electronic chassis such as radio racks and aircraft ground handling equipment.

The unit is identified as 27L. It is composed of two working parts for each assembly: a handle and an adjustable fork. The unit serves as handle, ejector, pull and lock.

The new units are made of aluminum alloy and measure 2 x 4.75 x 0.625".



Size and weight factors are reported to facilitate the handling of heavy equipment.

Another new development is the adjustable feature of the fork, to meet mounting dimension tolerances.

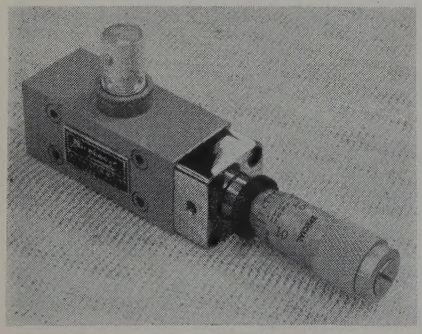
Latch sizes accommodate a minimum panel size of 5". A 6-lb. maximum load disengages the handle lock; maximum horizontal working load is 400 lb.; ultimate load, 600 lb.

The design has been developed by Camloc Fastener Corp., Paramus, N.J.

Tunable Thermistor Mount

The MA-525A tunable thermistor mount, with thermistor, is designed for sensitive measurement of RF power in RG 96/U waveguide transmission systems. Its availability was announced by Microwave Associates, Inc., Burlington, Mass.

Frequency coverage is 34.0 to 36.0 kmc/s with maximum VSWR of 1.5 The unit may be used over the complete waveguide range if higher input VSWR's are not a consideration. Nominal operating resistance is 200 ohms. Power handling capability is 10 milliwatts maximum.



The insertion loss is determined at 34.86 kmc/s and the value is marked permanently on each unit. The accuracy of the insertion loss measurement is plus/minus ¼ db. The critical element is a thermistor bead. The unit is machined from brass which is silver plated. External surfaces are painted with a blue-gray lacquer. A high quality micrometer drive assures accuracy and smoothness of operation.

Rotary Selection Switch

The Janco #1246 Rotary Selector Switch is manufactured to meet or exceed military specifications.

High temperature operating characteristics include continuous operation at 250 degrees F., appreciable periods of operation at 300 degrees F. and intermittant periods at 350 degrees F.

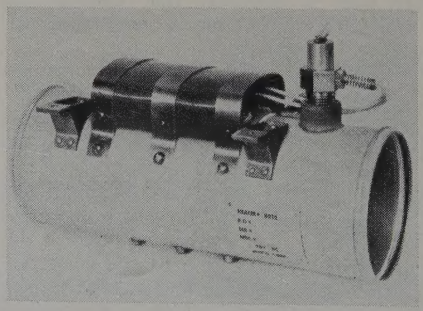
The switch is electrically rated at 6 Amps resistive load at 115V AC, 6 Amps resistive load at 28V DC and 3 Amps inductive load at 28V DC.

The Janco closed-construction permits a minimum of 10,000 double cycles of operating life with nine-plus common contacts on a single wafer.

For further information write to Gene Soltys, Janco Corp., 3111 Winona Ave., Burbank, Calif.

Electric Heaters For Pilot Compartments

Janco's electrical heater, 8032, is developed for heating pilots' compartments, navigation domes, warming instruments, radar systems, defrosting

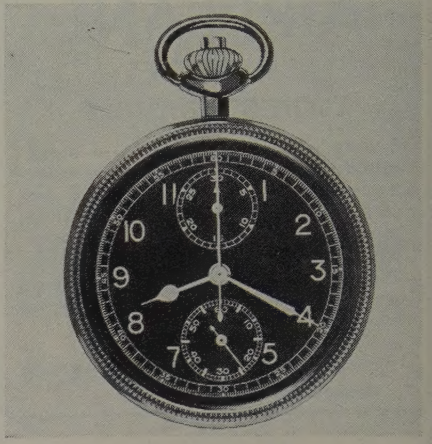


bomb sight windows and for wherever on the spot heat is required.

Specifications include elements guaranteed for 5,000 hours when operated at 12 lbs. of air flow per minute, or three positions of heat output.

Navigational Stop-Watch Offered

Wakmann Watch Co., Inc., has announced the availability of an 18-jewel, high-precision navigational stop-watch and chronograph.



Made to military specifications, the watch has been approved by the Bureau of Aeronautics. It is guaranteed to operate in extreme temperature (hot and cold) with deviations of only fractions of seconds.

More Accurate Measurements With Precision Hole Gage

More accurate measurement and broader application are key improvements in the new Model "C" Kwik-Check precision hole gage made by the Allied Products Division of Hamilton Watch Co., Lancaster, Pa.

The new model gage permits rapid and highly accurate measurement of small hole diameters with countersinks. It compensates for a countersink by measuring the hole diameter at the base of the countersink; it does not measure the countersink.

Simplicity of the gage permits gaging hole diameters in less than five seconds. Sizes covered are from 0.25 inches to .380 inches. Accuracy and readability of the gage is 0.0005 inches.

LAUGHING, *because he's safe in his Gentex 70EVC crop duster helmet. Made of 1-piece molded fiberglas, with double-safe chinstrap and energy-absorbing pads, helmet surpasses government standards. Available with or without the shatterproof visor.*